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Preparation of Standard Cellulose

For Dyeing Experiments

—Lignin-Free, Unmercerized and Neutral—

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(Contribution from the Pond Chemical Laboratory of The Pennsylvania State College)

Historical

IT IS a well known fact today that when cotton is treated with a concentrated solution of sodium hydroxide its fibers are shortened and swollen; and the amount of dye removed from the dyebath is a function of the degree of mercerization.[1]

During 1844-1850 Mercer noticed this effect and called the process mercerization. Mercer assumed that the change was due to the formation of a compound which decomposed on washing with water. Gladstone[2] undertook to determine the composition of the compound and gave it a formula $C_{24}H_{20}O_{20}.NaO$. He further noted that water and carbon dioxide decomposed the compound. Crum[3] made a study on the manner in which cotton, that had been treated with strong sodium hydroxide solution and washed with a weak acid, reacts with coloring matter.

Many methods are found in the literature for preparing cellulose free of lignin, namely: Schulze[4] (Potassium chlorate and nitric acid); Lange[5] (fusion with caustic alkalies at 180° C.); Cross and Bevan[6] (boil in 1% sodium hydroxide, wash and treat with chlorine gas, rewash and place in a 2% solution of sodium sulfite and bleach); Deans and Tower[7] (chlorination—method similar to that of Cross and Bevan); Parker[8] (heat cotton in potassium hydroxide solution at a temperature of 130° to 140° C.), and Leighton[9] (treat cotton with 1% sodium hydroxide for 18 hours at the boiling point). A modification of the method used by Leighton is the simplest and most satisfactory one.

The standard cellulose prepared by the method proposed in this paper is to be used in studying the principles of dyeing with substantive dyes. Since the pH of the dyebath is to be followed, it is desirable to have a cellulose which is neutral. The study will be carried out in a manner similar to that made by Briggs and Bull[10] with acid and basic dyes.

Since cellulose is a relatively inert material it seems only logical that, if pure, it should not affect the concentration of the hydrogen ion of water when refluxed in water for a period of forty-five minutes. It is the purpose of this work to prepare a pure, lignin-free and unmercerized cellulose which will not change the pH of water.

Apparatus and Materials

The pH of all solutions was taken with the stick antimony electrode. Since the antimony electrode was calibrated with buffer solutions which were in normal equilibrium with the oxygen and nitrogen of the air, it is necessary that any solution whose pH is to be determined must have the same normal equilibrium. Experimentally the equilibrium is satisfactorily obtained using 25 mls. of the boiling solution which has been cooled to 25° C. while a current of CO_2-free air is bubbled through it for 10 minutes. The solution is put into the cell with a saturated calomel electrode. The stick antimony electrode is polished with emery paper, wiped with a clean cloth, rinsed and put into the cell.

Kendall[11] has pointed out very definitely that water free from carbon dioxide is not practical for ordinary use because it is unstable in the presence of air. He has further shown that the carbon dioxide equilibrium and therefore the pH of water depends upon the source of the water supply and upon the atmospheric conditions. The water used throughout these experiments was collected from a Barnstead still; and the pH, which was

determined according to Parks and Beard[12] by using the stick antimony electrode, was found to vary from 5.2 to 5.8.

The cotton used throughout these experiments was furnished and processed by John Naab, 4025 Old York Road, Philadelphia. Long staple cotton was made up into 40's, 2-ply skeins weighing about five grams each, by passing it through the various machinery to make the cotton into yarn. No chemicals were used in the treatment of the cotton before it came to this laboratory. Unless otherwise stated a skein of this cotton was used in each determination. The apparatus consisted of pyrex, No. 160, 500 mls. extraction flasks fitted with No. 10 one-hole rubber stoppers and Hopkins' reflux condensers. Chemically pure reagents were used.

Experimental Work

Ordinary cotton contains lignin along with fats and salts. The method used to free the cotton from lignin and leave a constant per cent cellulose was that recommended by Leighton to prepare a standard and reproducible cellulose. Briefly, it is as follows: Treat the cotton with a 1% solution of sodium hydroxide for eighteen hours at 100° C. on a water bath (in his experimental work a 2% solution was used, but he concludes that a 1% sodium hydroxide solution would give the same results, probably because Parker found that a 1% solution of potassium hydroxide left the same per cent cellulose if heated for 3 hours at a temperature of 130° to 140° C.) wash with water and treat with hydrochloric acid, rewashing until neutral to litmus. It should be noted that when cotton is treated with sodium hydroxide the filtrate is light brown in color, evidently due to lignin as pointed out by Sherman.[13]

Since Leighton did not determine the change in pH caused by refluxing his standard and reproducible cellulose in distilled water or state the time required for the hydrochloric acid to remain on the cotton, a series of preliminary experiments were carried out to see if the cotton contained adsorbed acid[14] or alkali depending upon the length of time that the hydrochloric acid remained on the cotton.

For these experiments the cotton was boiled slowly in a 1% solution of sodium hydroxide for 18 hours and because the cotton extract was very dark brown other refluxes were made in fresh 1% sodium hydroxide solution until the extract became a very light straw color. The absence of this brown color was used as a basis to show that probably all of the lignin had been removed. The cellulose was next washed with distilled water until no test was given with phenolphthalein. Samples of this cellulose were used for the following experiments:

Treatment with 1% Hydrochloric Acid

After treatment with the hydrochloric acid for 30 minutes, as an example, the cellulose was washed with distilled water until the wash water gave no test for acid with litmus, the washing being continued for ten additional times. The samples were then refluxed for successive periods of 45 minutes in 250 mls. of distilled water having a pH of 5.6. After each reflux the cellulose was washed twice with distilled water. The pH of the cellulose extract after one reflux was 3.75 and and after eight, 5.16.

No Treatment with Hydrochloric Acid

When the cotton was not treated with hydrochloric acid the pH after one reflux was 8.92 and after eight, 6.88. The washing and refluxing were carried out as described under treatment with 1% hydrochloric acid.

Treatment with Carbon Dioxide

Carbon dioxide was bubbled for 15 minutes through 250 mls. of water containing a sample of cellulose which was then washed and retreated with carbon dioxide. The cotton was washed five times with distilled water. Table I, Part A, gives pH data for successive refluxes of 45 minutes in 250 mls. of distilled water having a pH of 5.6. The cellulose was washed twice after each reflux. The results recorded in Table I, Part B, were obtained by refluxing two representative samples which were taken after treating 60 skeins of the cellulose for four hours with carbon dioxide, thoroughly washing, and re-treating for eight hours with carbon dioxide, after which it was washed with hot distilled water. The four samples used in this treatment were dried at 102° C. and refluxed once in water with a pH of 5.6. The results are given in Table II.

A microscopical examination showed that the cotton was not mercerized by treating it with 1% sodium hydroxide. The ash content was determined in a platinum dish and found to be 0.05%.

After carrying out the preliminary work to obtain the method of preparing standard and reproducible cellulose, four series of duplicate experiments were carried out by treating in the following manner a skein of cotton, which was dried for 18 hours in an oven at 105° C. to drive off all moisture, cooled in a disiccator over anhydrone and weighed: The sample was boiled slowly for 18 hours in 250 mls. of 1% sodium hydroxide solution, washed with distilled water until the wash water failed to give the pink color with phenolphthalein, and placed in 250 mls. of distilled water through which carbon dioxide was bubbled for 15 minutes. The cotton was washed three times with distilled water and treated with carbon dioxide as mentioned above. The final washing was carried out by using a continuous flow of hot water collected directly from the Barnstead still for one-half hour. This gave six complete changes of water. The sample was dried in an oven at 105° C. and weighed. The cellulose was finally refluxed for 45 minutes in 250 mls. of distilled water of known pH and the pH of the cellulose extract determined. Each sample was given five successive treatments.

The loss in weight during each reflux was calculated as per cent loss during that reflux, and given in Table III A. The average loss for the four samples is plotted against the number of the reflux in Figure I. Table III B represents the pH of water in which the cellulose sample was refluxed, and of the cellulose extract. It should be noted here that the dark brown color caused by the lignin failed to appear after the third treatment.

Table I

The Undried Cellulose Refluxed in Water with a pH of 5.6

	A Each Sample Treated Separately with CO_2		B Samples from a Large Quantity Treated with CO_2	
Reflux	pH Sample 1	Sample 2	pH Sample 1	Sample 2
1	5.50	5.36	5.33	5.27
2	5.39	5.48	5.32	5.47
3	5.35	5.48	5.33	5.27
4	5.29	5.47	5.36	5.36
5	5.28	5.10	5.23	5.27
6	5.32	5.27	5.44	5.38
7	5.32	5.33		
8	5.33	5.28		
Average	5.33	5.34	5.33	5.32

Table II

Cellulose Dried at 102° C. and Refluxed Once in Water with pH of 5.6

Sample 1	Sample 2	Sample 3	Sample 4
5.56	5.56	5.50	5.50

Discussion

Although Leighton prepared a cellulose which was standard and reproducible for his purpose, results show that it does not give a reproducible pH. When the cellulose has been treated with hydrochloric acid, long refluxing tends to show that hydrochloric acid is adsorbed. Practically, it is impossible to remove all of the adsorbed hydrochloric acid by washing in water. It should be further noted that varying amounts of hydrochloric acid and sodium hydroxide are removed by refluxing for successive periods of 45 minutes.

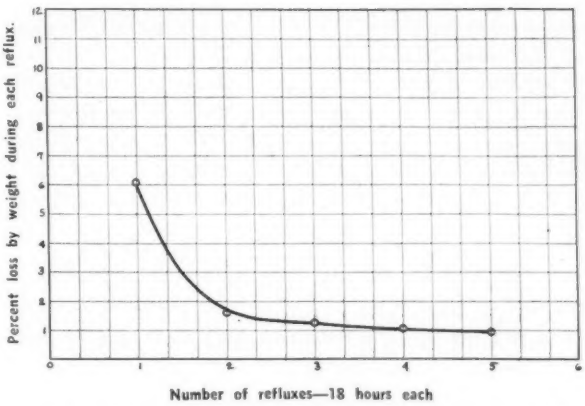

Fig. 1.—Loss of weight of Lignin by Refluxing Cotton with 1% NaOH.

After long refluxing in fresh distilled water it is possible to remove the alkali. As pointed out in the discussion on distilled water, the water contains a small amount of carbon dioxide which reacts with the small amount of the sodium hydroxide remaining in the cotton to form the bicarbonate of sodium, which is easily removed.

When samples of cellulose were treated with carbon dioxide, as described, carbonic acid is formed which prevents the hydrolysis of sodium bicarbonate and is slightly adsorbed by the cellulose. Small quantities of it are removed by washing and refluxing, making the pH of the cellulose extract low as noted in Table I. An examination of Table II indicates that the pH of the cellulose extract is very close to that of water showing that the cellulose has reached the desired carbon dioxide equilibrium.

Table III A

Weight of cotton after refluxing for periods of 18 hours in 1% NaOH solution, treating with CO_2, washing and drying at 150° C.

					Per cent loss by weight during each reflux				
Reflux	Sample 1	Sample 2	Sample 3	Sample 4	Sample 1	Sample 2	Sample 3	Sample 4	Average
0	5.0052	4.8424	4.9099	4.7851	0.00	0.00	0.00	0.00	
1	4.7057	4.5480	4.6031	4.4996	5.98	6.08	6.25	5.97	6.07
2	4.6281	4.4753	4.5255	4.4227	1.55	1.50	1.57	1.60	1.55
3	4.5627	4.4174	4.4657	4.3678	1.31	1.20	1.23	1.15	1.22
4	4.5086	4.3644	4.4163	4.3229	1.08	1.09	1.00	0.94	1.03
5	4.4641	4.3156	4.3707	4.2744	0.89	1.01	0.93	1.02	0.96

Table III B

pH of the water and the cotton extract showing absence of NaOH

	Sample 1		Sample 2		Sample 3		Sample 4	
Reflux	pH Water	pH Extract	pH Water	pH Extract	pH Water	pH Extract	pH Water	pH Extract
1	4.93	4.91	4.93	4.98	4.93	5.06	4.93	5.06
2	5.06	5.02	5.06	5.08	5.06	5.12	5.06	5.01
3	5.30	5.30	5.30	5.46	5.30	5.37	5.30	5.28
4	5.68	5.78	5.74	5.75	5.90	5.57	5.76	5.51
5	5.09	5.40	5.40	5.51	5.25	5.33	5.37	5.38

The average of all the pH's of the water before refluxing	5.26
The average of all the cellulose extracts	5.30
Difference	0.04

Because of this equilibrium an excess treatment with carbon dioxide does not interfere.

Each pH represented in Table III B may be considered as a separate determination for the complete removal of sodium hydroxide by the carbon dioxide treatment. The average of all the pH's of the water before refluxing is 5.26 and of the cellulose extracts is 5.30 showing that the pH of the cotton extract is only 0.04 of a pH higher than water.

It is possible to duplicate fairly accurately the percent cellulose remaining after any number of refluxes. Parker and Leighton give as a constant about 92.2 percent cellulose remaining after one reflux. Three refluxes with 1% sodium hydroxide gave 91.18 percent cellulose remaining. It should be noted that through the third reflux, the sodium hydroxide cotton extract is brown, the average percent loss by weight of the four samples is much greater than from the following refluxes, and Figure 1 shows a decided change in slope of the curve at this point. Therefore it is logical to stop after the third reflux.

In view of the preceding work the following method is recommended for the preparation of a large quantity of cellulose. Boil the cotton slowly in 1% sodium hydroxide solution for three successive periods of 18 hours each. The ratio should be one gram of cotton to 50 mls. of 1% sodium hydroxide solution. Reflux again if the brown color remains. Wash the cotton with distilled water until no positive test with phenolphthalein is obtained. Bubble carbon dioxide into water containing the cotton for 3 minutes per gram—the minimum time is 15 minutes, wash and repeat the carbon dioxide treatment for 6 minutes per gram—the minimum time is 15 minutes. Wash with hot distilled water, allowing 500 mls. of water per gram of cotton. Dry in an oven at 102° C. for 48 hours and keep in a desiccator over anhydrone.

Summary

1. The standard and reproducible cellulose as prepared by Leighton gave a practically constant percent cellulose, but failed to give cellulose extracts with water of a constant and reproducible pH. The pH of the cotton depended upon the length of time that the HCl remained on the cotton.

2. A large quantity of standard and reproducible lignin free, unmercerized, and neutral cellulose can be prepared by treating cotton skeins with 1% sodium hydroxide solutions for successive periods of 18 hours at the boiling point until the solution from the cotton reflux is a light straw color. Wash the cotton with distilled water until no reaction with phenolphthalein is obtained. Bubble carbon dioxide into water containing the cotton, wash and repeat the carbon dioxide treatment. Wash and dry in an oven at 102° C. for 48 hours.

3. Microscopical examination shows that the cellulose has not been mercerized.

4. The ash content was found to be 0.05%.

REFERENCES

[1]Knecht, Rawson, and Loewenthal: "A Manual of Dyeing," London, 33 (1925); Livet: Tiba, 263, 391, 527, 651, 775, 907, 1023, 1155 (1930).

[2]Gladstone: J. Chem. Soc., 5, 17 (1853).

[3]Crum: J. Amer. Chem. Soc., 16, 1, 404 (1863).

[4]Schulze: Chem. Zent., 321 (1895).

[5]Lange: Z. physiol. Chem., 14, 217 (1889).

[6]Cross and Bevan: "Cellulose; An Outline of the Chemistry of the Structural Elements of Plants," London, 95 (1895).

[7]Deans and Tower: J. Am. Chem. Soc., 29, 1119 (1907).

[8]Parker: J. Phys. Chem., 17, 219 (1913).

[9]Leighton: J. Phys. Chem., 20, 32 (1916).

[10]Briggs and Bull: J. Phys. Chem., 26, 845 (1922).

[11]Kendall: J. A. C. S., 38, 2460 (1916).

[12]Parks and Beard: J. A. C. S., 54, 856 (1932).

[13]Sherman: J. A. C. S., 19, 291 (1897).

[14]Leighton: J. Phys. Chem., 20, 188 (1916); Miller: Adsorption by Activated Sugar Charcoal, Technical Bulletin No. 73, Agricultural Experiment Station, Michigan State College, 33 (1925).

Warwick Expands

The Paterson, N. J., warehouse of the Warwick Chemical Co., is now located in new and larger quarters at 190 Sixteenth Ave. They are occupying a modern building of approximately 7,500 square feet of space ideally located and equipped to meet the requirements of the company's storage and delivery service, the latter being conducted by fast trucks to the Paterson, Pennsylvania and Metropolitan areas. The Paterson branch is under the direction of the Scherr Bros.; Robert, Edward and Martin, all of whom are well known in the textile trade.

The company has recently placed on the market a fatty alcohol product sold under the trade name of "Sulphonol," this being an addition to their line of sulfonated oils, water-proofing agents, sizing materials and other textile chemicals.

Settle Trade Disputes

Trade disputes involving approximately two million dollars were settled by arbitration in the silk, rayon and allied industries during the past year, relieving the courts of practically all cases of litigation over merchandise for this industry, the Arbitration Bureau of the Federated Textile Industries, Inc., reports. More than 200 cases were submitted for arbitration by members of the silk and rayon trade, an increase of 77% over the previous year and of 177% over 1931.

The largest sum of money involved in a single case was $74,000. Cases involving under $2,000 totaled 68; $2,000 to $5,000, 47; $5,000 to $10,000, 45; $10,000 to $20,000, 32; over $20,000, 25.

Addresses Students

C. H. Robertson, Collector of Internal Revenue and formerly Manager and Superintendent of Eno Cotton Mills, Hillsboro, N. C., recently addressed the students of the Textile Division of the University of North Carolina.

The Continuous Dyeing of Loose Cotton

on a Large Scale in the United States and Soviet Russia*

By J. BRANDWOOD

IN CONSIDERING the dyeing of loose cotton, it is well to consider first the advantages and disadvantages of handling the material in this form.

Its disadvantages are obvious, e.g., the possible specking of other colored yarns by the inevitable fly and lint from cardroom and frame, as well as the loss of dye caused by the coloring of waste and strips from the cards. On the other hand, when loose stock is dyed, it can be converted into cloth with the least possible amount of handling, and in the case of weft, entirely without winding, since the dyed stock is ring-spun direct on to the quills or bobbins for the automatic loom. In the case of warp yarns, less handling and transferring from one form to another are needed than in any other process with the exception of beam dyeing. The solidity of shade in a fabric made from loose-stock-dyed material, if the dyeing is carried out properly, is exceptional, and the colors exhibit "bloom" and "life" to such an extent that similar effects cannot be reproduced in yarn- or piece-dyed fabrics. Probably the polishing effect of the cards and frames on the dyed fibers is the cause of "lively" colors on loose-stock-dyed goods.

For the production of mixture yarns and mock grandrelles it is almost essential to dye the loose cotton, but generally, the weight to a shade employed is small and does not merit the employment of the type of machine to be described.

These machines are economical only in a self-contained mill having around 5,000 looms and more, and where the production of cloths is organized so that a limited number of shades may be employed, the variation in style being a result of designing a large range of fabrics from relatively few colors. The result is not so monotonous a range as might be anticipated.

Historical

The oldest method of dyeing loose cotton is to use large dye vats and to submerge the cotton in the dye-liquor. Poles are used for stirring the cotton, which when dyed is washed in the same vessel, then hydro-extracted and dried. This method is so primitive and the result so poor that it is unworthy of attention in a mechanized age. The labor cost is high when compared with the production figures.

The current commercial method in the United States, where the mill organization is based largely on the employment of dyed stock, is to use circulating dyeing machines capable of holding a charge of 500 pounds of cotton. The machine is loaded by hand, trodden down, and a heavy cover placed over the charge and bolted in position. After dyeing and washing, the charge is unloaded by hand into hydro-extractors, and from there unloaded and delivered to the dryers. The results, as regards even dyeing, are poor, since it is almost impossible to load the machine to offer an equal resistance to the liquor circulation. For the same reason, it is difficult to obtain effective washing of the charge, and with vat and sulfur colors, the hands of the operatives are affected badly. Two batches of 500 pounds per 9-hour day are produced. There is little possibility of efficient matching of shade.

It is obvious that if loose cotton can be dyed in a continuous machine, disagreeable work can be eliminated and the labor cost considerably reduced.

The wool-washing machine was used first to utilize this idea, but the cotton floated on the surface of the bath, became felted by the action of the swinging rakes and, owing to the absence of a positive means of penetration, the dyeing was of little use.

A further ingenious attempt to solve the problem was made in the United States by the employment of a slowly-rotating, long cylinder, having its axis between the vertical and horizontal planes. The lower end dipped into the dye-bath, and a pump caused a flow of liquor to pass slowly through the cylinder to its upper end, where it returned to the vat. The cotton was fed into the vat, carried through the cylinder, and delivered at the upper end by the flow of liquor and the action of vanes inside the cylinder. The result was no better than that obtained

*Presented at meeting, Manchester, Eng., October 20, 1933, of Society of Dyers and Colourists. Reprinted from their journal.

from the wool-washing machine and the machine was discarded.

When the matter came to the attention of the writer, it was felt that success could be achieved in a continuous machine only if the cotton could be confined to a relatively thin layer, the penetration accomplished by pressure and, inasmuch as the thin layer or lap had been formed for the dyeing, a squeeze press used for the elimination of the water before drying.

The Development of the Continuous Machine

Preliminary experiments showed that if the cotton, in the form of a rough lap, were held between two virtually continuous conveyors, which permitted the circulation of the dye-liquor, the lap could be dyed most efficiently in a period of seconds for the darkest shades, provided that sufficient pressure and thus resultant-flow were possible through the two conveyors and the lap they contained. The conveyors must move all the time, of course, and it was obvious that they were the crux of the problem.

The market was searched for a suitable conveyor material, but none was found. Woven conveyors of Monel metal were tried, but were unsuitable. At last, the conveyors were made by forming spirals of nickel-alloy wire, ¼ inch diameter × 57 inches wide, about 4 pitches to the inch, these being interlaced mechanically, and the completed conveyor then annealed and flattened under a pair of chilled iron rolls at about 20 tons pressure. The resulting conveyor had great flexibility, a smooth surface and could be made endless by "running-in" a spare wire spiral and hammering it flat. The finished article had great durability in use, but the cost of sufficient conveyor for the contemplated machine was around £200, a portion of which could be salved by the scrap value of the material.

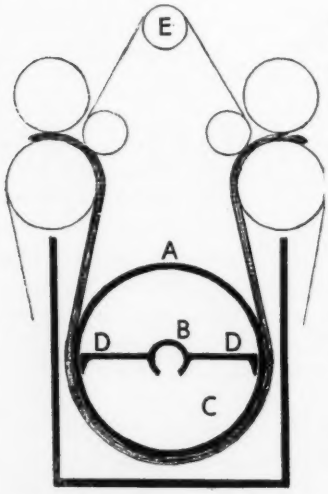

Fig. 1—Method of obtaining circulation of liquor through conveyors and cotton lap.

The breaking-strain of the conveyor across its 57-inch width was 18 tons, but even so there were likely to be strains that could not be calculated. However, future events showed that the conveyor was quite satisfactory, and the design has remained static ever since and does not appear capable of improvement.

The exact method of obtaining the circulation through the two conveyors and the cotton lap next claimed attention, and Fig. 1 shows the method adopted. The perforated cast-iron cylinder A, with closed end-plates was caused to rotate at conveyor speed; its axis was provided by the pipe B, which was connected to the suction-end of a 6-inch centrifugal pump of special character. Owing to the cut-off D, the pump may only suck through the lower part of the cylinder, the part covered by the two conveyors containing the cotton lap. The pump discharges into the same vat, so that the circulation is completed. The cylinder A is driven in the actual machine with a slip-motion and its speed is slightly less than that of the main conveyor. It will be noticed that only one conveyor passes completely through the vat so as to prevent reverse curves with the two conveyors.

The roll E is spring-loaded and acts as a tension device on the short apron; also it is moved automatically in a horizontal direction at one end to act as a guide and to keep the short conveyor in a central position. The principle employed is that used on the wire of a paper-making machine, but with a pneumatic relay.

The First Continuous Machines

The resulting machine was offered in the best market, i.e., the United States, and one installation was placed in each of four mlils using large quantities of dyed loose cotton.

The largest mill, which had the first installation, had more than 24,000 looms, and the machines proved to be satisfactory. The schematic arrangement is shown in Fig. 2. It will be seen that the arrangement is simply the sum of a series of vats as shown in Fig. 1.

Each perforated cylinder has its own special 6-inch centrifugal pump, and each vat its own short conveyor, while the lower continuous conveyor runs round the bottom of the machine to enter again.

All the conveyors are guided pneumatically and require no attention.

The rough lap is formed by a hopper-feeder into which the undyed stock is fed, the lap is then compressed by the double lattice until it is accepted by the main conveyor. It is carried next through the machine, wetted-out in the first vat, dyed in the succeeding two, given a running-wash in the third box, i.e., the wash water passes once only through the cotton and then is discharged to the drain, and finally a circulating wash with a small per cent of water spilled to waste in vat 5, which is kept hot. The lap then leaves the main conveyor of the machine and passes to the squeeze-press-lattice feed, which has a slightly greater surface speed and is fed into the final squeeze-press where it is subjected to a pressure of 14 tons to eliminate as much water as possible before drying. The fan breaks up the resulting squeezed lap and delivers it to the dryer, which is generally located on the floor above the dyehouse. It reaches the dryer in a loose, open and fluffy form without lumps, and can be carded and spun with greater ease than the undyed stock.

The conveyor speed is 1.66 yards per minute. The cotton lap has a weight of 10 pounds per lineal yard on the conveyor. The lap width is 54 inches and production is 1,000 pounds dry cotton per hour, with no labor except that needed for preparation of the dye-vat feed. The

weight of the machine without dryer is 20 tons; it occupies a space of about 38 × 10 feet. The lap is under the influence of the wetting-out and washing pumps for 36 seconds, and under the influence of the dyeing pumps for 72 seconds. The power required is 75 h.p.

A large range of colors was produced on these machines with sulfur and vat dyes.

The method of dye control and matching will be described later for the current series of machines, as it is identical for both the early and later machines.

It was found that the machines were able to dye loose cotton continuously and without hand-labor at a labor cost of one-fortieth pence per pound material dyed and dried ($ calculated at par), and that the evenness of the dyeing and continuity of shade were unapproachable with other methods.

The size of the plant, however, appalled some of those who inspected it, and it was remarked that the machine resembled a miniature battleship. It was not the size that concerned the writer, but a factor in connection with the inspection of the machines. It is obvious that when a mill management decides to rely upon one or more large and complicated machines in the place of several simple ones, the interruption of service of the large units is a serious matter. It is necessary, therefore, to ensure that the larger machines are subjected to periodical examination to prevent failure in operation. The period desirable in this case seems to be at intervals of six months.

Here the weakness of the early machines was seen. In order to inspect them thoroughly, it was necessary to strip the whole upper part of the machine before the large cylinders could be removed, so that a loss of a week's time every six months took place.

It was decided, therefore, to redesign the machine with accessibility more in mind, but here another difficulty was experienced. By this time, the inflation period in the United States had ended and it was not easy to find users for this large and expensive machine. Some of the early four machines were forced at this period to yield an output of 2,000 pounds per hour, and were running as well as usual, but this was thought to be an inadvisable practice.

The Continuous Machine in Soviet Russia

In 1927, the writer had shown the Soviet Delegation for Textiles, then in the United States, a number of these machines at work. Early in 1930, the Soviet Government showed great interest in these machines and sent a delegation specially to the United States to study them, as there were none at work in Europe.

As a result, one machine was installed in the works of Melangovogo Combinata., Ivanovo-Vosnesensck, a few hundred km. north-east of Moscow. This machine was built in England.

In order to improve the accessibility, it was decided after many experiments, to adopt the scheme shown in diagram Fig. 3. The revolving perforated cylinders were abandoned and a stationary vacuum box used instead. The top of the box is covered with stainless steel rolls of small diameter set at close pitch. These are held in anti-friction bearings and are not driven. They revolve by the friction contact of the bottom conveyor. The centrifugal pump, exactly as described, is connected with its suction-end to the vacuum box, and delivers into the same vat.

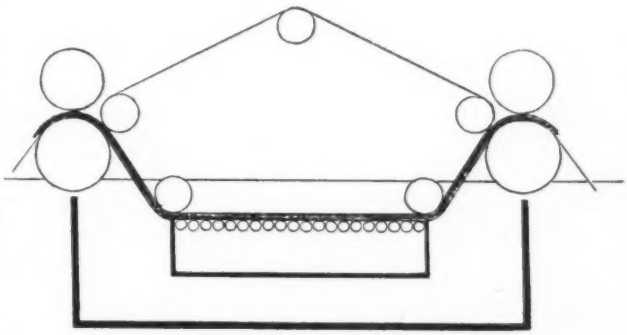

Fig. 4—Continuous dyeing machine of improved accessibility.

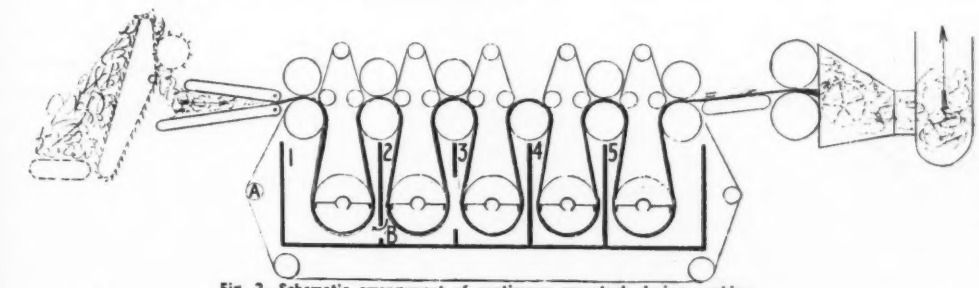

Fig. 2—Schematic arrangement of continuous raw-stock dyeing machine.

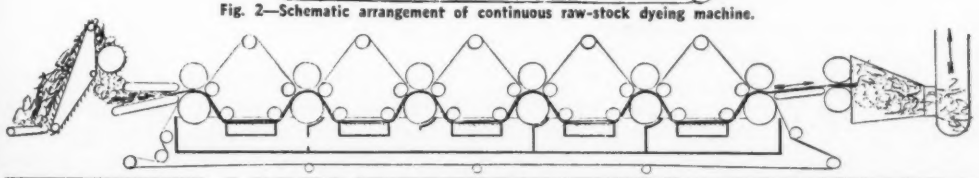

Fig. 3—Sectional diagram of the latest type of Brandwood's continuous raw-stock dyeing machine.

The surface of the vacuum box had the same area as that of the available surface of the perforated, revolving cylinders in the earlier machines. Thus, the length of the machine was increased greatly, but the machine could be stripped and re-assembled for the six-monthly examination in 8 hours.

As the Soviet Delegation wished to have the largest machine in the world, the production of the machine at standard speed was increased to 1,250 pounds dry cotton per hour. It was delivered in 1930.

Operation in Soviet Russia

The writer accompanied the machine to the U.S.S.R., and when it was erected its size worried even the Soviet worshippers of "Americanski Tempo." They knew it was the first of its type and, as the rest of the mill was almost ready for operation, were concerned lest it should fail.

The complete machine is shown in Fig. 4. It will be seen that it is simply a multiplication of the scheme shown in Fig. 3.

There is a wetting-out vat, two dye vats, used as one, a cold, running water washing vat, and a final hot washing vat.

The cotton in the hopper feeder was kept to a constant level by an automatic feed from the cleaning room, and the fan at the delivery-end of the machine delivered the dyed, squeezed cotton to the dryers, which were located on the fifth floor.

The machine was successful and produced more than the guaranteed quantity of dyed cotton. The dyeing and condition of the material were excellent. The labor cost was round about 1/100d. per pound dyed cotton and the dyestuff economy on sulfur dyes was ahead of that obtained with German, non-continuous machines.

The space occupied by the machine without dryer was 75 × 12 feet. Power taken was 70 h.p. Weight of cotton lap per lineal yard = 12.5 pounds. Conveyor speed was 1.66 yards per minute. Lap width = 54 inches. Weight of machine = 30 tons. Length of main conveyor = 120 feet. Production = 1,250 pounds per hour. Conveyor life = 6 months; during this time the machine has produced 5,500,000 pounds dyed cotton with a working day of 24 hours. Cost per pound for conveyor renewal = 0.005d.

Dyestuff Mixing, Feed Control, and Matching

On the basis previously given, it will be seen that 4 machines consume about 35 metric tons dye per working week, calculated on a Sulfur Black basis, and reasonable provision must be made for handling this quantity.

The feed and control arrangements are as follows—Each machine has two tanks located on the floor above; these feed, one at a time into the dye-vat through a fixed orifice. The pressure on the nip where the cotton leaves the dye-bath is 4 tons. The dye-liquor remaining in the cotton is 150%, and it is found that with 1,250 pounds cotton passing through the machine each hour, the dye-bath loses 187.5 gallons. The feed tank, therefore, must feed 187.5 gallons water per hour into which the dye to give the required shade and the salt to maintain the requisite density of the bath are added. Corrections for shade must be made in the strength of the dye-feed and not in the volume.

Since the cotton enters the wetting-out bath dry, and leaves the dye-bath containing 150% liquid, the dye-bath is connected to the wetting-out box by a 3-inch hole in the division plate. There is always a flow from the dye-box to the wetting-out box in order to maintain the same level. However, as the cotton which enters the wetting-out bath contains a great deal of air, the action is not reversible and the dye is not thrown out of solution by this air, which is eliminated in the wetting-out box and by its pump.

Knowing the shade desired, and the approximate formula, the feed-tank is made up and a shade taken in 10 minutes. If the shade is not correct, a new bath is prepared in the second feed-tank and a sample examined in 10 minutes. This must continue until the shade is found. In practice, it can be done almost at once.

The feed-tanks are gauged to be filled at 187.5 gallons. A gauge on the side of each tank is calibrated in minutes. When a new tank is to be used, a time-clock near to the feed-tanks is set at a particular time and the main gauge on the feed-tank follows the minute hand of the clock. If it lags, the feed-pipe contains an obstruction, which is blown out by steam.

Discussion

The Chairman (Mr. W. F. A. Ermen) said it was difficult to venture an opinion concerning the performance of the extraordinary machine described by Mr. Joseph Brandwood. A dye-house manager in this country would feel probably some misgivings on his first acquaintance with the apparatus, but, as the Lecturer had stated, the machine was operated and controlled in a comparatively simple manner.

Mr. P. G. Jones inquired whether any dyeing had been done on piece goods with vat colors in the machine?

The Lecturer replied in the negative. The production would be very small at the speed of 1.66 yards per minute. The machine with the drier and accessories, represented an outlay of almost £10,000; consequently, piece goods could be dyed more cheaply in other machines.

The Chairman asked if it were possible to run several pieces together through the machine? Drying could take place on "tins" at the end of the machine.

The Lecturer said that in such a case, it would not be necessary to have conveyors. The material would be already in a form to carry itself, so that it would merely run from the rolls. Very good continuous dyeing machines in this country for piece goods were available.

Dr. T. A. Forster asked how long it took to clean the the machine when it was desired to alter a shade? Also, had any machines been constructed with fewer sections to dye direct colors, or with more sections to dye basic colors, or were they used almost solely for vat colors and sulfur colors?

The Lecturer said that it took 4 to 5 hours to clean the machine when it was desired to dye a new shade. Basic colors had not been tried, because there was no demand for them in the countries in which the machines were used. The sunlight was intense, and the dyed mate-

(Continued on page 103)

Depreciation of Textile Machinery

How Should It Be Estimated?*

By A. W. BENOIT

THE question of depreciation as applied to textile machinery has attracted much attention from textile mill owners, engineers, and accountants during the past few years. There has been a wide variance of opinion as to how it should be estimated, what should be included, the proper amounts to apply, and, having arrived at some answer, what should be done with it. Government officials, mill owners, engineers, and accountants approaching the problem from different angles, have at times arrived at widely differing conclusions, so that one gets the impression that "depreciation" is an elastic quantity to be expanded and contracted to produce some desired combination of figures.

Arbitrary Figures Should Not be Used

Rates of depreciation on a given machine may change, but the factors which enter into the determination of the proper amount of depreciation should not be ignored nor should arbitrary figures be used in order to improve the appearance of a situation.

Depreciation is the shrinkage of value. It is generally expressed as a percentage which is the increment to be deducted from the original cost or the replacement cost to determine the book value at any given time.

The three main factors which influence the amount of depreciation to be applied to any textile machine are age, wear and tear, and obsolescence.

Age, or normal life expectancy, is obviously one of the principal determining factors in the amount of depreciation to be deducted each year. It is difficult to draw any fine line between "age" and "wear and tear" because one is to some extent a factor of the other, but for most classes of textile machinery there is a fairly well-recognized age limit. However well a machine may be built, and irrespective of its upkeep, the time eventually comes when, for one reason or another, it cannot be operated economically. The number of years a machine may operate will vary considerably, depending on the character of the construction, the operation it performs, and its working speed, whether or not water and steam are used in connection with it, and the treatment it receives at the hands of the operator. From the day it is started up, a gradual deterioration goes on in a machine, imperceptible at first, but becoming apparent with the years, until accumulated infirmities overcome it and it is fit only for the scrap heap.

The Life of Machines

This period of life for some machines may be as short as 10 or 15 years, and for others occasionally as long as 50 years. For instance, dyehouse and wet-finishing machinery deteriorates rapidly and, in spite of replacement of parts and repairs, has a relatively short life. On the other hand, machines that are in dry, favorable locations and run at moderate speeds, such as cards, could be operated for many years if age were the only factor. Many machines 35 years of age or older will be found in active production in textile plants. Mechanically, they are still in fair condition, and, were that the only factor, they might be used for several years more. From a study which was made in 1930, it was estimated that 60 per cent. of all the cotton spindles in the United States were more than 20 years old. Of these, a great many must have been more than 35 years of age. Mechanically they might still produce if other factors did not make their operation difficult or even impossible.

"Wear and Tear"

But age is only one factor; of equal importance is "wear and tear." The depreciation from this source is dependent upon the conditions under which a machine is operated, the hours of operation, and the amount of repairs which are expended upon it.

Machinery located in rooms in which there is sufficient humidity to cause the rusting of working parts, as in dyehouses, or where there are acid fumes to corrode metal parts, as in carbonizing rooms, or sufficient dust to make lubrication difficult, as in picker rooms, will wear out faster than will machinery which is operated under more favorable conditions. If the lubrication of machinery is systematic, regular, and thorough, there will be less wear than if there is only haphazard and infrequent lubrication.

The number of hours of operation per year has a very definite effect upon machine life. The length of the usual working year is from 2,400 to 2,700 hours. If the machinery is operated on two shifts, or about 5,400 hours a year, it will wear out much faster than machinery which is run on only one shift.

The maintenance of machinery by the replacement of

*Contributed by the Textile Division for presentation at the Annual Meeting of The American Society of Mechanical Engineers, and printed in Mechanical Engineering.

worn parts, thus keeping it in good working condition, will lengthen its operating life but not beyond the time when its advanced age would naturally retire it. It is a common fallacy to assume that the life of a machine kept in excellent repair is indefinite.

Rapid Obsolescence

While the life expectancy of any textile machine can be reasonably predicted in so far as age and wear and tear are concerned, there is still much uncertainty when the element of obsolescence is considered. And to add to the difficulty, it is obsolescence which, at the present time, is the principal factor in retiring machinery.

A machine may become osolete as the result of (1) an improvement which improves the quality, or increases the quantity, or reduces the cost of the product to such an extent that machines of the old model can no longer compete; and (2) a radical change in the character or finish of fabrics demanded by the public or a permanent style change which renders a machine useless to the industry. This does not apply to the seasonal style changes which leave small groups of machinery idle for a portion of every year.

No time element is attached to obsolescence. Either of the just-mentioned causes of obsolescence may reduce a new machine to its "junk" value in a short time.

Gradual Obsolescence

Again, obsolescence may be the result of making a great many more or less minor improvements to a machine over a period of years, which, in the aggregate, make possible a much superior model and render the older machines worthless. In such cases the depreciation due to obsolescence is increased with each improvement and, theoretically at least, the amount of this depreciation can be ascertained at any time by comparing the machine with the latest models with reference to quality and quantity of product. The annual cost of operation in excess of that of the new machine, properly capitalized, represents the depreciation due to obsolescence. This is an annual charge which would start when measurable improvements are made, and it increases with each such improvement.

One saving feature of these situations, however, is the time element which prevents new improvements or new models from being put into operation in quantity as soon as they are brought out. This is due sometimes to the lack of financial means, partly to the inability of the machine manufacturer to supply the demand all at once, and partly to the inherent natural resistance of mill owners to innovations until they have proved themselves. Therefore, until an improved or new model is being used by a sufficient number of competitors, so that its lower operating cost is a determining factor, the mill with the older equipment is under no particular disadvantage.

Difficulty of Establishing Definite Annual Amount

In attempting to set up definite annual amounts for depreciation due to obsolescence, one is confronted with many difficulties. The time element is so variable that it is not possible to draw any conclusions. There are periods of great activity among the machinery builders in redesigning their entire lines, during which obsolescence is very rapid, followed by periods of lesser changes and less obsolescence.

Depreciation, therefore, is a composite quantity made up of losses due to age, wear and tear, and obsolescence. The depreciation used is not necessarily the sum or the average, but the greatest of the three. Each of the three elements, when applied to a particular machine, might give a different annual rate, depending on the conditions surrounding it. Of these different rates, it is evident that the one which gives the shortest life governs, and is the rate which should be used.

In one case, where there is no appreciable wear on parts and no change in design, it might be the gradual deterioration of age alone. The rate arrived at in this case is invariably low and is not ordinarily a governing factor.

The wear and tear on a wide variety of textile machinery is quite severe, and even though repairs are consistently and carefully made, there is a definite limit fairly well established beyond which it is not economical to operate it. From our observation, we would place that limit at from 20 to 35 years, depending upon the particular type of machine. These figures give another rate of depreciation which is usually higher than that obtained from age alone.

Forecasting Machinery Developments

When we attempt to set an annual rate of depreciation covering obsolescence, we are in difficulty because we are trying to forecast future development in machinery and its effect upon the useful life of a machine. In the case of any one type of machine this would be impossible, but some general conclusions can be arrived at from past experience and the trend of the times. In the period prior to 1920, comparatively little progress was made in the development of new textile machinery. This does not mean that there was no development, but that it consisted largely of minor improvements to existing machinery, which made existing machinery, obsolete only over a period of years.

Radical Changes Since 1920

In the few cases of outstanding improvements there had not been a sufficient number installed to control the market prices. The relatively large amount of textile machinery which was more than 25 years old and which was still operated successfully in competition with newer machinery is evidence that this was so. However, since 1920 there have been many radical departures in design and consequent improvements in quantity and quality of production, with a lowering of labor costs, so that many machines which date beyond 1920 are obsolete. There has also been a keener appreciation of the advantages of the improved machines by the mill owners, and the period between the offering of improvements and their general adoption has been shortened. It seems probable that the present trend of textile-machinery manufacturers to con-

(Continued on page 105)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

FEBRUARY 12, 1934

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E. I. Du Pont de Nemours & Co., Wilmington, Del.

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Lowell Textile Institute, Lowell, Mass.

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DONALD H. POWERS — **HUGH CHRISTISON**
CARL Z. DRAVES — **WALTER M. SCOTT**

President Emeritus and Chairman of the Research Committee

LOUIS A. OLNEY
Lowell Textile Institute, Lowell, Mass.

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Leverett N. Putnam, Chairman, Worsted Division, Pacific Mills, Lawrence, Mass.
Clarence L. Nutting, Secretary, Arlington Mills, Lawrence, Mass.

Rhode Island Section
Heyward F. Lawton, Chairman, Borden & Remington Co., Providence, R. I.
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Charles A. Seibert, Secretary, 39 Chestnut St., Salem, N. J.

Piedmont Section
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South Central Section
Harold Schroeder, Chairman, Dixie Mercerizing Co.
Harvie Bruce Kimbrell, Secretary

Midwest Section
Eric F. Hempel, Chairman, National Knitting Co., 2165 South First Street, Milwaukee, Wis.
Elmer F. Smith, Secretary, American Aniline Products, Inc., 820 S. Clinton St., Chicago, Ill.

South-Eastern Section
Charles B. Ordway, Chairman, Alabama Polytechnic Institute, Auburn, Ala.
C. A. Jones, Secretary, Georgia School of Technology, Atlanta, Ga.

Lowell Textile Institute Junior Section
Raymond L. Matthews, Chairman; Charles L. Daley, Secretary.

North Carolina State College Junior Section
R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

ANNUAL MEETING, MID-WEST SECTION

THE Annual Meeting of the Mid-West Section was held at the Bismarck Hotel, Chicago, Illinois, Saturday evening, January 20, 1934.

The business meeting was preceded by the usual informal dinner, seventy-eight members and guests being present.

Carl E. Bick, Chairman, presided and called the meeting to order at 8:30 P. M. Mr. Bick introduced Morton H. Wertheim, charter member of the Association, recently transferred from Philadelphia to Mid-West Section.

Mr. Bick then spoke on the Amendment providing for Sustaining Memberships which was passed at the last Annual Meeting of the National Association, letter pertaining to same having been mailed to all members by Mr. Graves. He urged all members to give serious consideration to these memberships, as the annual dues were insufficent to carry on the work of the Research Committee, one of the most important activities of the Association.

Minutes of the previous meeting were read and approved.

Mr. Berry, Treasurer, read the financial report, which was approved.

Chairman Bick then called for a rising vote of thanks to the Committee who so ably handled arrangements for the Annual Meeting of the National Association held last September at Chicago, Illinois.

He also spoke on the membership of the Local Section, which has dropped during the past two years and suggested a committee be formed to investigate members who have been dropped for non-payment of dues.

Mr. Brainerd made a motion that the incoming Secretary be Chairman of this committee.

Motion seconded by Mr. Berry and approved. He then called on Mr. Eich, Chairman of the Nominating Committee, composed of the following members:

J. Eich, Chairman
B. Blowney
A. Brainerd
W. Bergh
E. Morgan

Mr. Eich presented the following nominations:

Chairman—Eric F. Hempel
Vice-Chairman—A. J. Feit
Treasurer—M. Fleischmann
Secretary—E. F. Smith

No other nominations were offered and the Chairman instructed the Secretary to cast one ballot.

Mr. Eich then presented the following nominees for the Sectional Committee:

S. Berry
E. Scharf
V. Hartquist
N. Ruston

No other nominations were offered and the nominees were unanimously elected.

Mr. Eich offered the nomination of Carl Bick for Councilor.

No other nominations being offered he was unanimously elected.

Mr. Blowney moved for a rising vote of thanks to the outgoing officers.

Mr. Bick then presented George H. Johnson, Director of Research, Laundryowners' National Association, who gave a very interesting lecture on "How Your Mill Products Stand Laundering."

A rising vote of thanks was given to Mr. Johnson.

As there was no further business, the meeting was adjourned at 10 P. M.

Respectfully submitted,

FRANK A. ACKER,
Secretary.

ANNUAL MEETING, SOUTH CENTRAL SECTION

THE South Central Section held its Annual Meeting at the Read House in Chattanooga, Tennessee, on the evening of January 21, 1934. Fifty-four members and guests were present. Chairman Harold Schroeder of the Dixie Mercerizing Company presided.

Election of officers for 1934 resulted as follows:

Chairman: Harold Schroeder, Dixie Mercerizing Co.

Vice-Chairman: Nestor Grotelueschen, Magnet Mills.

Secretary: Harvie Bruce Kimbrell.

Treasurer: Homer Whelchel, Central Franklin Process Co.

Former chairman Noel D. White gave a delightful talk about his recent Central American Trip.

Technical papers was presented as follows:

"Silk Throwing" by G. W. Searell of Jacques Wolf Co.

"Silk Degumming" by Henry Gaede of Laurel Soap Mfg. Co.

Lively discussions followed.

The section was pleased to have as guests Arthur R. Thompson and Walter Hadley.

Respectfully submitted,

ANDREW KELLY, *Secretary.*

EIGHTY-SIXTH RESEARCH COMMITTEE MEETING

THE 86th meeting of the Research Committee was held in the rooms of the Providence Engineering Society, Providence, R. I., January 26, 1934. Dr. Louis A. Olney presiding.

The following members were present: Wm. H. Cady, H. C. Chapin, Hugh Christison, Carl Z. Draves, H. F. Lawton, H. W. Leitch, Hans Meyer, Wm. R. Moorhouse, G. A. Moran, Alex. Morrison, D. H. Powers, W. M. Scott, W. S. Williams.

Regrets were received from Dr. Rose, Arthur R. Thompson, Jr. and H. F. Herrmann.

The work of the sub-committee on Standard Methods of Chemical Analysis for Textiles as Applied to the Textile Industry was discussed, and the opinion was expressed that the scope of this committee might be greater than was practicable. It was suggested that it might be better to sub-divide this committee into various sub-committees dealing with specific analytical methods. It was voted that the Chairman of the Research Committee confer with Dr. Harold upon the future work of the committee and report at the next meeting.

Correspondence from Ralph Hart in regard to possible research work upon silk was read and discussed. The discussion was principally in regard to the capacity of silk to take up oil during the soaking process; the action of light on silk; the degumming of silk; and, the hastening of the decomposition of silk by certain dyeing methods. The advisability of forming a special sub-committee upon silk was proposed by the Chairman. The appointment of such a committee met with favor.

Correspondence from Dr. Harvey A. Neville of Lehigh University referring to cooperative work at Lehigh University was read by the Chairman. The correspondence suggested the possibility of the Research Committee of the A. A. T. C. C. cooperating in the work which was being carried out through certain Research Fellowships at Lehigh University. The policy of our Research Committee cooperating with universities wherever it was requested was approved, and upon motion of Dr. Draves it was voted that the Chairman of the Research Committee be empowered to grant requests from any educational institutions that we cooperate in their research work, providing that proper acknowledgment to our Research Committee be made and that we have the right of simultaneous publication of the results in our Proceedings.

The present and future work of our Research Committee was discussed at some length, as well as the Research Program for the coming year. Dr. Powers, Chairman of this Committee took an active part in the discussion.

Bertil A. Ryberg, Research Associate, who has been working upon the Carbonization of Wool during the past year, presented suggestions for future work upon the same subject; it being pointed out that as yet the whole subject of carbonization with aluminum chloride had not been studied. Neither had the direct action of acid on burrs during the carbonization process.

The possibility of a study of the various methods of determining grease content in wool was also discussed.

Harold W. Leitch, Chairman of the Sub-Committee on Materials for Construction of Dyeing and Finishing Machinery, presented an interesting report, which will be found immediately following. It was understood that

this report would be supplemented at a later date with a bibliography upon this subject.

Report of Sub-Committee on Materials Used in the Construction of Bleaching, Dyeing and Finishing Machinery

Sub-Committee Chairman, HAROLD W. LEITCH

The ever-changing requirements and the steadily increasing number of available materials for the construction of bleaching, dyeing and finishing machinery, make it inadvisable to establish laboratory methods for the testing of such materials for this work.

Charts were prepared showing the strengths of solutions of various chemicals, mixtures of chemicals, temperatures, etc., used in a number of methods for dyeing cotton, wool, and silk. It was thought that such charts might be used as a basis for laboratory tests. A study of these charts, however, shows that such a basis is not sufficient, and the charts would be valuable only to those who are unfamiliar with such processes. Tests depending upon visable corrosion, etching, or loss of weight of a sample are generally unsatisfactory.

Laboratory tests of metals and alloys for use in machines where there is contact with acids have been successful to some extent. One method consists of dyeing a skein of worsted yarn in a glass beaker containing a solution of the acids, a piece of the alloy, and a dyestuff sensitive to the metals of which the alloy is composed. Welded alloy may be tested in the same manner. The temperature required for the dyeing limits this method largely to the testing of metals for use in dyeing machines. Chrome Black T (C. I. No. 203) is an example of a dyestuff sensitive to iron, copper, and nickel, when dyed by the chrome top method. The alloy sample may be removed before chroming, if the effect of the bichromate on the alloy is not of interest.

Although much can be learned regarding the suitability of materials for specific purposes by extensive laboratory tests, it seems advisable to base final judgment on extended trials with a commercial or semi-commercial unit.

The means of making joints, such as welding with or without annealing, is a very important consideration in the selection of a metal for equipment.

Resistance of a metal to the action of chemical solutions, vapors, etc., is sometimes very materially influenced by grinding, polishing, mechanical, or heat treatments to which it has been subjected.

Surfaces that are not kept clean by mechanical contact of the material being handled, or by contact of another part of the machine, may become coated with a thin film by partial corrosion, or by a precipitate from the solutions or materials, used in the process, or by a combination of these, and thus become protected from serious corrosion.

A protective film may be formed on an alloy by hydrochloric acid, but the presence of sulfuric acid may destroy this film or prevent its formation even though the sulfuric acid itself may not have appreciable action on the alloy.

An example of another type of protective film of high resistance to both chemical action and abrasion is the film formed by passing an electric current through certain electrolytes so that aluminum (or an alloy of it) is anode.

Electrical potentials may possibly be set up when two different alloys or metals are used in the same equipment, and thus cause failure. Lack of active flow of liquors, such as bleaching liquors, may allow continuous action on the metal at one point and cause pitting.

Resistance should not be considered solely on the basis of durability: the effect on the process must be considered. Examples are:— effect on the color of dyeings; smutting; decomposition of hydrogen peroxide solutions, etc.

In making tests of materials, great care must be taken to note the condition of the surface and joints. If possible, record any special treatment given during manufacture or prior to testing. Pickling, grinding, or polishing may have a considerable effect. On account of conditions such as mentioned above, and the difficulties of reproducing conditions as found in practice, experimental determinations (in the laboratory) of the suitability of metals and other materials for specific purposes often fail to indicate the correct results.

Dr. Draves presented a report of the Sub-Committee on the Evaluation of Wetting-Out Agents, and asked that it be made official. It was so voted. The official method will be published in the 1933 Year Book.

The Chairman made a statement in regard to the progress being made in the formation of a special Sub-Committee composed entirely of Southern members of the Association for research work especially in regard to the mercerization of cotton. An organization meeting of this committee it scheduled for February 10 in Atlanta, Georgia. It is hoped that the formation of this committee will create an increasing interest in the work of our Research Committee in the South.

The preparation of the 1933 Year Book was discussed particularly in regard to what should be covered on the list of proprietary preparations which it is planned to publish in the coming edition.

The Chairman's appointment of Dr. Harvey A. Neville as a member of the Research Committee was approved.

Respectfully submitted,

HAROLD C. CHAPIN
Secretary

UNEMPLOYMENT REGISTER

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive

NOTE. Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the AMERICAN DYESTUFF REPORTER.

A-2

Education—B.T.C., Lowell Textile Institute, 1932; also course in shorthand and typing.

Experience—None to date, interested in quantitative analysis, experimental dyeing, color matching, dye testing and dye identification. Ability to learn quickly and will go anywhere. 23 years old, single.

A-5

Education—B.T.C., Lowell Textile Institute.

Experience—Assistant chemist in carpet mill, dye tester in dye plant, research and analytical work in silk dyeing and finishing plant laboratory, plant chemist and overseer of bleaching in surgical dressing plant, assistant chemist in woolen mill. Age 29. Married.

A-B-2

Education—Lowell Evening Textile School, 1917.

Experience—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing. **A-B-C-1**

Education—Graduate Industrial Chemical Engineer, Pratt Institute—1911.

Experience—One year as plant control chemist, 4 years as laboratory chemist with gas company, 13 years as plant chemist with bleaching, dyeing and finishing plant. (Rayon and cotton piece goods). Formulated processes and put them into plant operation, 1 year as chemist and demonstrator for dyestuff company, 1 year as superintendent colorist with print works printing linen and rayon, 1 year as director of testing laboratory for national dry goods concern. **A-B-E-1**

Education—B.S. in chemistry at C.C.N.Y. Working now on M.A. at Columbia.

Experience—7 years as dye tester and color matcher for dye manufacturer; 6 months skein silk and rayon dyer; 4 years textile chemist and dyer for cotton finishing concern; 2 months boss bleacher and 4 years as teacher of organic chemistry and dyeing. Age 38, single.

A-E-2

Education—B.T.C., Lowell Textile Institute, 1933.

Experience—Assistant instructor in chemistry, Lowell Textile Institute. Member of scholastic honorary fraternity. **A-E-1**

Education—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

Experience—10 years' experience teaching in colleges, subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references. **B-1**

Education—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

Experience—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

B-2

Experience—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References. **B-3**

Experience—Foreman piece dyer for the past 21 years. Can dye the following; celanese, rayon, cotton slacks, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work. **B-6**

Education—Graduate R. I. School of Design.

Experience—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References. **B-7**

Experience—4 years as assistant to manager in ribbon mill; 2 years as boss dyer on veils, chiffons and silk skeins; 5 years as boss dyer on ribbons and skeins (cotton and silk); 7 years as boss dyer on spun silk (pure dye and fast) resisted colors; last 12 years as hosiery dyer on silk and cotton, silk-cotton, rayon or wool. 50 years old, married. References. **B-8**

Education—Chemistry and Dyeing Department, Philadelphia Textile School.

Experience—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

B-9

Experience—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere.

B-10

Experience—Ten years in top dyeing for fancy men's wear trade, knitting trade and sports wear; also piece dyeings on men's wear, crepes, sports flannels and tropical suitings; also several years association with commission dyeing trade doing tops, worsted skeins, cotton skeins, piece dyes, peroxide bleaching, naphthols, mohair plushes and imitation caracul cloths. Familiar with many types of machines. 38 years old, single with dependents.

AMERICAN
DYESTUFF
REPORTER

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Vol. XXIII February 12, 1934 No. 4

SHORTER HOURS

A YEAR or two ago we wrote an editorial suggesting that at some time in the future a universal six hour day and five day week would be in effect to take care of the unemployment problem. According to various estimates about four million people have been put back to work on temporary jobs of government creation. In addition to this there are about six million unemployed. This makes a total of about ten million people who have not been called back into industrial positions even with the advent of the NRA. Of course there are a certain number of people who would not work no matter how many jobs were open but at the same time the fact remains that there are many without work who are looking for it. We are told that business has picked up considerably in the last few months and that the road to recovery lies straight ahead (with certain highway markers to make the route a little easier to follow). What we would like to know is: Supposing everyone who wanted to work could obtain a job and work forty hours a week —how long would it last? With modern efficiency of production we are under the impression that it would not be many years before over-production would be eminent and people thrown out of work again. To our mind all the needs of all the people could be satisfied with a thirty hour work week—giving steady work to everyone, rather than a few months or years of work and then a few months or years without work. Let's make a permanent balance on our production and consumption.

HASKELL AS DIRECTOR

THE appointment of General Wm. N. Haskell as Director of the Code Authority for the Rayon and Silk Dyeing and Printing Industry, has been welcomed not only by the dyers and printers themselves, but by the entire silk and rayon industry. To manufacturers and converters as well as to the dyers, the appointment is interpreted as an assurance that the affairs of this branch of the industry, which has suffered so much from unrestricted competition in the past, will soon be straightened out and order and uniformity in production and the price situation established, so that the whole industry will benefit from the new open policy which will eliminate secret deals and prices and rebates to some customers which have worked injustice to others not so favored in the past.

There is no question about the importance of dyeing and printing in relation to the production of finished silk or rayon goods. Furthermore, the dyer and finisher who does first class work is certainly entitled to receive fair compensation for his efforts. If the chiseling and unfair practices carried on by some elements in the dyeing and printing industry are eliminated, the whole structure of the entire industry from raw material to finished product will be substantially strengthened.

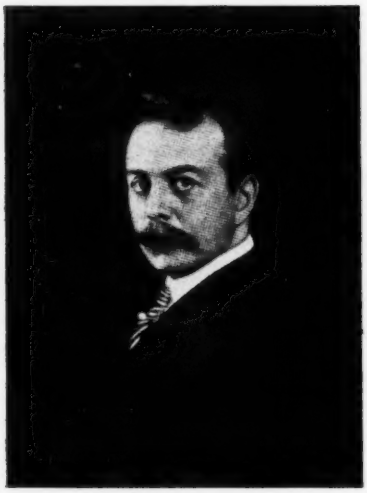
During the past month higher price schedules have been put into effect by most all of the silk and rayon dyers. As it has been generally accepted that the prices previously charged for their services have been entirely too low for some period of time the new prices have been accepted with a minimum of protest by manufacturers and converters. The belief that the new prices quoted have been the same for one and all has aided materially in the acceptance of the new price schedules.

The Code Authority will have its problems to iron out however; particularly in the case of silk vs. rayon. There has been a feeling among the manufacturers and converters of silk goods that the prices charged for dyeing and printing of silk have been higher in proportion to the same charges for the processing of rayon. If such a condition were true it would give rayon fabrics an advantage in market competition against silk. For this reason it is expected that in the near future the various silk interests will attempt to bring about a readjustment of prices in regard to the proportionate prices of processing silk and rayon. This will probably mean higher prices for the processing of rayon rather than a lower schedule on silk, thus allowing the dyers and printers a more reasonable margin of profit on rayon than is at present in effect.

Because of the welcome reception of the announcement of Mr. Haskell as Director of the Code Authority for this industry, it is forecast that he will have the hearty cooperation of the trade.

ERNEST CADGENE

Dr. Ernest Cadgene, founder and president of the Lyons Piece Dye Works, Paterson, N. J., one of the largest silk dyeing companies in the world, died suddenly Sunday morning, Feb. 4th, at 4 o'clock at his home in Englewood Cliffs, N. J. He was 54 years of age.



Dr. Cadgene was born in Lyons, France, on March 31, 1879, the son of Jacques and Lucie Cote Cadgene. He was married at Cormaranche on July 28th, 1900, to Marie Pervilhac, daughter of Henry Pervilhac and Bertha Preaud Pervilhac.

He obtained most of his education in Switzerland, where he studied at the Polytechnikum at Zurich, from which institution he received his diploma as a chemist. He later obtained a degree of doctor of philosophy from the University of Zurich.

After completing his education he entered the dye trade under the direction of his father. He made a thorough study of dyes and their manufacture so that when he came to this country in 1904 he was recognized as an expert in this line. He was first employed in this country by the Weidemann Silk Dyeing Co., which is now a unit of the United Piece Dyeing Co. Later he went with the American Silk Dyeing and Finishing Co. and in 1909 he organized the Cadgene Piece Dye Works with Herman Simon of R. & H. Simon. In February, 1913, he built the Lyons Piece Dye Works which has specialized in the pure dye process and various types of printing.

Dr. Cadgene is survived by his wife, Mrs. Marie Pervilhac Cadgene, three sons and two daughters. He was a member of the French Legion of Honor by which he was decorated in 1929. He was a member of the Hamilton and Arcola Country Clubs and of the French Chamber of Commerce.

WALTER D. PHILLIPS

On January 31st, Walter Dabney Phillips died at his home in Scarsdale, N. Y., after a prolonged illness. Mr. Phillips was manager of the American Diamalt Co. in Cincinnati, Ohio, a subsidiary of the Fleischmann Co., in 1908 when Diastafor was introduced by the American Diamalt Co. Later the Diamalt Co. was taken into the Fleischmann Co., which eventually became Standard Brands, Inc., and who are today marketing Fleischmann's Diastafor.

As manager of the Diamalt Co. and later vice-president, which connection he held almost up until the time of his death, Mr. Phillips was largely responsible for the introduction and continuous sale of Diastafor since 1908.

He was a native of Richmond, Va., and was educated at Brown University. While he was perhaps not widely known in the textile field he had many friends and acquaintances there who will regret to hear of his passing.

Meeting of S. O. C. I.

A meeting of the American Section of the Society of Chemical Industry will be held on Friday, February 16th at 7:30 P. M. at the Chemists' Club, 52 East 41st St., New York City. The meeting will be devoted to an address by Prof. Donald B. Keyes of the University of Illinois on Cooperative Studies on Sulfur Dioxide Removal from Flue Gases. These studies are illustrative of the investigation carried out by the Chemical Engineering Division of that university in conjunction with industry. Anyone interested in the subject is invited to attend. A dinner will be held prior to the meeting at 6 P. M.

Meeting of S. O. C. M. A.

The regular monthly luncheon and general meeting of the Synthetic Organic Chemical Manufacturers Association was held at the Chemists' Club, New York City, on Thursday, January 18th at 12:30 P. M., President Merz presiding.

A letter from Dr. E. H. Killheffer acknowledging the honor bestowed upon him when elected as an honorary member of the Association was read. Attention was called to the Ninth Annual Dinner of the Drug, Chemical and Allied Trades Section to be held at the Hotel Waldorf-Astoria on March 8th. Reports were heard on the status of the Food & Drug Act Bills and considerable discussion was held on the new tariff policies.

Alumni Meeting

A combined meeting of the New York Alumni of the textile schools of Lowell, Fall River, New Bedford and Philadelphia was held at the Arkwright Club on Tuesday evening, January 30th. About one hundred persons were present to enjoy the excellent address of Senator E. D. Smith, Chairman of the Agricultural Committee of the U. S. Department of Commerce, who spoke on inflation and money matters. It was originally intended to have Secretary of Commerce Roper speak but due to pressure of official business he delegated Senator Smith to take his place. Judging from reports Senator Smith's subject matter and manner of presentation were very well received by all who attended.

The Progress Achieved in the

Calico Printing Industry

by the Application of Hydrosulfite-Formaldehyde*

By LUCIEN BAUMANN, G. THESMAR, L. LANTZ, and F. A. M. NOELTING

WE HAVE already reviewed in this Bulletin† (1910, p. 66) the new types of production introduced into the domain of printing since the appearance of hydrosulfite-formaldehyde. We pointed out the important position in our industry already won this product and we put forward the conviction that this precious reducing agent would be called upon, in the very near future, to render us other and more signal services.

We were not mistaken in our predictions. The present note, which forms a kind of complement to the article mentioned, aims at giving a sketch of some interesting types of manufacture, the real technical and industrial value of which we have been able to appreciate by prolonged experience. We wish to speak of the use of vat colors, for direct printing as well as for discharges and illuminations on dyed grounds.

Vat Colors in Direct Printing.—The constant efforts of the dyestuffs factories have led to the appearance of a new series of vat colors which lend themselves as well to direct printing as to the illumination of dyed grounds. Thanks to their remarkable fastness, these colors were predestined to find ever more numerous applications; notably for shirting goods; this manufacture constitutes incontestable progress.

Composition of Color Preparations

The composition of the color preparations is based on hydrosulfite-formaldehyde, alkaline carbonate and glycerine and hardly varies from one color to another. The stability of the colors being irreproachable, there is no loss of product under this head, so that the process is economical, in spite of the high prices of the coloring matters. Fixation takes place by a short steaming in a small Mather and Platt.

Vat Colors for Illuminations on Grounds.—The application of vat colors for the illumination of direct grounds is of constantly increasing importance in our works, for summer goods as well as for fine fabrics, such as satinettes, batistes, etc. The variety of grounds available and the richness of the illuminations, comprising all the possible colors, enable us to obtain, without difficulty, effects that could not have been produced formerly.

The composition of these discharge colors is analogous to that of colors for direct printing, only the quantity of hydrosulfite-formaldehyde varying according to requirements.

The finishing consists of a four minutes' steaming in a small Mather and Platt, then a continuous open width washing and soaping.

For the illumination of azoic grounds produced on the fiber itself, such as paranitraniline red, α-naphthylamine bordeaux, etc., a mere increase of hydrosulfite-formaldehyde is not sufficient for the production of good discharges. Para red, in particular, gives bad results. We have found that an addition of anthraquinone does away with this difficulty and produces, in all shades, illuminations of perfect purity.

Application of Hydrosulfite-Formaldehyde for Discharges on Grounds of Alizarine Colors.—The process of producing discharges on alizarine grounds by the action of caustic alkali in presence of a reducing agent is not new and has already been put into practice in different ways. Its principle resides in the dissolving action exercised by the alkali on the components of the alizarine lake, an action which is favored by the presence of a reducing compound.

The first process of this kind was the production of a white and blue on red style by Schlieper and Baum, which consisted in printing the alkaline color on fabrics prepared with glucose.

Later, various authors described the addition of glucose or stannous compounds to the printing color itself. But all these processes hardly gained recognition. Moreover, they involved, in general, complicated and little used finishing methods.

Easily Produced Multi-Color Discharges

Through tests made some years ago, we already knew that Turkey red was perfectly discharged by using hydrosulfite-formaldehyde in these colors. The appearance on the market of vat colors fixing precisely in the conditions for discharging alizarine has made the multi-colored discharge of the goods easy, thus giving them a new importance.

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*Sealed Communication No. 2057 deposited with the Soc. Ind. de Mulhouse in December, 1910. †Dyer and Calico Printer.

After putting to the test a whole range of discharge colors, we have adopted this process, which is of particular interest on account of its remarkable fastness.

These preparations contain, besides the color, hydrosulfite-formaldehyde and a rather strong amount of caustic alkali. An addition of sodium silicate is particularly favorable and materially contributes to the purity of the tones.

After printing, the goods are passed for four to eight minutes (that is to say, once or twice) through the small Mather and Platt, washed and soaped at a rather high temperature.

As grounds, we employ not only Turkey red, but also other dyeings with a base of alizarine or its derivatives, etc., produced either by the usual dyeing on mordants, or by double padding according to the method of Erban and Specht.

New General Releases

The General Dyestuff Corporation has issued circulars on the following products. Copies of these may be obtained on request.

Acid Alizarine Red 3BG—a new chrometopped Red, producing yellowish reds said to be of very good fastness to light. It is recommended by the distributors for the production of combination shades on loose wool, slubbing, yarn and piece goods.

Palatine Fast Dyestuffs—a new sample card showing in straight dyeings and in combination shades of the available range of this class of colors. Shades of very good fastness to light, washing, water, salt water, and perspiration are said to be obtained by simply dyeing in a Glauber's salt-sulfuric acid bath.

Lenocal A L Liquid—a new product for desizing linseed oil sizes from rayon or mixed fabrics. This product is a liquid, miscible in water in any proportion and is slightly alkaline in aqueous solutions. It is recommended by the manufacturers to use it with a soap.

Anthralan Violet 4 BF—a new acid dyeing alizarine color said to be very level dyeing and producing brilliant bluish violet shades of very good fastness to light. Its other fastness properties are said to meet the requirements for ladies dress goods.

Fast Orange Salt L G—a new stable Diazo Salt which in conjunction with Naphtols AS- OL, AS- LT and AS-TR produces brilliant orange shades of yellowish character, which are said to possess very good fastness to light, washing, chlorine and boiling.

Palatine Fast Red GRE—a new brand of the Palatine Fast series which when dyed from a strong Glauber's salt-sulfuric acid bath, produces a yellowish red said to be of very good fastness to light. It has in general the same fastness properties of the Palatine Fast colors.

Ramasit K Conc.—a circular describing its use for making wool yarn, slubbing, hosiery and other knit goods water repellant.

Alizarine Supra Blue A—a new acid blue manufactured by General Aniline Works and offered to the trade by the General Dyestuff Corporation. When dyed from a Glauber's salt-sulfuric acid bath it produces bright blue shades said to be of excellent fastness to light. It is further claimed that the fastness properties in regard to perspiration, steaming, hot pressing, rubbing, carbonizing and stoving are very good.

Gold Medal Awarded

"For pioneering in industrial research," the General Electric Company was presented on Thursday, February 1, with a gold medal by the American Institute of the City of New York. The American Institute, which was founded more than one hundred years ago, includes among its objectives the recognition of achievements in science which have profoundly influenced human affairs.

The Council on Awards of the Institute has decided that the establishment and maintenance by the General Electric Company of its large laboratory for pure research has been of lasting benefit to human progress and industry. This laboratory, which was created in 1900, when Dr. Willis R. Whitney went to Schenectady from the Massachusetts Institute of Technology to assume the position of research director, for the company, has been the scene of scientific discoveries which have greatly expanded existing industries and have created in several notable instances large new industries.

The exercises on February 1 took place at the Museum of Natural History in New York, where a dinner was served, followed by the presentation speech by the president of the American Institute, Dr. H. H. Sheldon. The medal was accepted by Dr. William D. Coolidge, the present director of the General Electric Company's research laboratory. An hour's program of laboratory demonstrations was then given by scientists of the laboratory staff.

The American Institute has not made an award of this sort for many years. The General Electric Company has never before received an award as a corporation, although many of its scientists and engineers have in times past received awards for their individual achievements. The most conspicuous of these was the award to Dr. Irving Langmuir, associate director of the research laboratory, of the Noble prize in chemistry for 1932. Dr. W. R. Whitney, founder and upbuilder of the laboratory, retired from its directorship in 1931, but retains the title of vice president in charge of research.

Marriage Announced

Doctor and Mrs. Howard Victor Dutrow of Dayton, Ohio, have announced the marriage of their daughter Mary Katherine to Mr. Harry Leigh Derby, Jr., on Saturday, January 20th.

After a brief wedding trip Mr. and Mrs. Derby will return to make their home in Chicago, where Mr. Derby is in charge, as District Manager, of the American Cyanamid and Chemical Corporation.

White and Colored Discharges

on Alpha-Naphthylamine Garnet with Hydrosulfite-Formaldehyde*

By LUCIEN BAUMANN, G. THESMAR and A. HUG

Combination of Iron and Salt—Nitrite Process with Organic Acid—Aromatic Base Process

AMONG the different processes of discharging α-naphthylamine garnet described in our previous communications, the process consisting of the use of hydrosulfite-formaldehyde in presence of an iron salt and of nitrite is particularly notable for the good results it gives. This process, by the clearness of its discharges, by the simplicity of its application, which is performed in the ordinary conditions of working, and finally, by the great stability of the color, is superior not only to the alkaline iron discharge, which gives really satisfactory discharges only on certain fabrics, but also to the process of discharging without an iron salt, with addition of an aromatic base and of an organic acid to the discharge color.

Drawbacks of Iron-free Discharge

This iron-free discharge suffers from the drawback of not always giving satisfactory results if, as the organic acid component, the easily accessible acids are used, such as oxalic, citric, tartaric, salicylic, etc., acids. Moreover, it involves in these cases, either repeated steaming or steaming at a higher temperature. As regards really efficient acids or acid ethers, such as levulic acid methyl and ethyl tartrate, etc., they are to-day still of a price which makes all practical application of them impossible.

But, if the above-mentioned process with an iron salt and nitrite give entire satisfaction for white discharges on α-naphthylamine garnet, the execution of colored discharges according to the same method would seem to run up against serious obstacles, notably by reason of the subsequent acidifying compelled by the presence of iron in the color. For basic colors especially, the problem would appear to be complex, owing to the difficulty of reconciling in one and the same color the simultaneous presence of tannin and an iron salt without the brightness of the basic lakes suffering from this.

However, we have succeeded in surmounting all these difficulties, and have been able to produce on α-naphthylamine garnet a very complete range of colors.

For the majority of our colored discharges, the process consists essentially in a fusion of our two processes already mentioned, one of which is carried out with an iron salt and a nitrite, while the other makes use of the aromatic base and the organic acid without addition of iron. As M. Jeanmaire has already described for colored discharges on para red, we dissolve the coloring matter in aniline, mix this solution with the white discharge containing rongalite, the iron salt and the nitrite, and finally add to the whole the aqueous solution of tannin. An addition of organic acid to the colors is generally necessary to obtain a good discharge. The quantity to add varies according to the purity of the rongalite employed.

Prepared in this manner, the colors do not allow any precipitate to appear, and they do not form any even after long standing. In presence of aniline and hydrosulfite-formaldehyde, the tannin not only does not form lakes with the basic colors, but also does not combine with the iron salts.

Good Stability of the Discharges

The stability of these discharges is very good. The colored effects are irreproachable and withstand without appreciable degradation in acidifying treatment in 2 deg. Bé. sulfuric acid, naturally on condition that one chooses the most appropriate colors. Indeed, one cannot indifferently apply all the basic colors to this process. The azines, oxazines, and thiazines should be employed in preference to the triphenylmethanes which are almost totally decomposed. The yellow basic dyestuffs, in general, do not give satisfactory results.

We would mention, as a particularly interesting color, induline scarlet which gives on tannin a dark brown, capable of being used with advantage for the preparation of puce shades, dark modes, cachou, dark grey, etc.

For other colors which may be employed without addition of tannin, such as thiazol yellow, for example, we have found it advantageous to dissolve the coloring matter in phenol. The phenolic solution is then simply added to a white discharge of appropriate composition.

The colors of the phthalein class (rhodamine 6 grm.,

*Sealed Communication No. 1575, deposited with the Soc. Ind. de Mulhouse in 1905.

rhodine 3 gr., etc.) do not give good results on tannin. The discharge and the fixation of the color are much superior if tannin is replaced by stannic oxalate or another tin mordant. The degradation on acidifying is insignificant. It is essential, for the development of the shade, to impregnate the fabric before drying, with a weak solution, either of a copper salt or of a vanadium salt. By this treatment, the shade, which after rinsing is violet, turns rose at the moment of passage over the drum.

The finishing of the goods is of the most simple kind. After a passage of 3½ to 1 minutes in a small ordinary Mather & Platt at 100 deg. C., the material is left over night, so as to assist the re-oxidation on the fiber of the reduced colors, then washed at open width in cold water, acidified in sulfuric acid 2 deg. Bé., washed, soaped with ametic at 30 deg. C., rinsed and dried on the drum.

The yellow effects with thiazol yellow, the tone of which is rather greenish, can be changed to an orange yellow by the addition of a small quantity of an organic acid to the finish. The numerous colors composed of this same yellow (greens, olives, oranges, cachous, modes) also take on a redder tone by this treatment.

The Formula

The white which serves as the base of all these colored discharges is as follows:—

300 or	300	90-94 per cent. sulfoxylate-formaldehyde.
500 or	500	starch-gum, dissolve, add in the cold: ni-
——	——	trite of soda (dry), then the solution of
8 or	8	
——	——	
16 or	16	ferric chloride
32 or	32	citrate of soda, cryst.
16 or	16	water
20 or	20	white glycerine
——	——	
8 or	6	tartaric acid powder
15 or	15	formaldehyde 40 per cent.
—— or	30	bisulfite of soda (26 per cent. SO_2)
20 or	20	essence of turpentine
——	——	
1,000 or	1,000	

It is interesting to note that the white, to give good discharges, seems to require the presence of a certain amount of bisulfite-formaldehyde, which is either added as it is, or is formed in the color by the action of the organic acid and the formaldehyde on the sulfite, always present in a small quantity. The part of the bisulfite-formaldehyde probably consists in bringing the sulfoxylate-formaldehyde into the decomposition and splitting which it itself undergoes during steaming. This addition is only necessary for rongalites of extreme purity, the less concentrated products already containing sufficient bisulfite-formaldehyde as an impurity.

Pontacyl Violet 12B

Pontacyl Violet 12B, an acid dyestuff which produces very bright bluish shades of violet, has just been announced by the Dyestuffs Division of E. I. du Pont de Nemours & Company. It is said to be bluer and brighter than Pontacyl Fast Violet 10B and as level dyeing as the Du Pont Anthraquinone Blues, possessing, in addition, the advantage of turning less red under artificial light than the majority of acid violets.

Pontacyl Violet 12B is recommended by the manufacturers for use on wool and worsted yarn and piece goods, and also on pure silk when dyed in an acid bath. In addition, it is said to be suitable for printing on wool. Acele, cotton and rayon effect threads are said to be practically unstained; and combinations of wool and silk may be dyed to a uniform shade.

The dyestuff is said to be very fast to ammonia, ironing, rubbing, stoving and water spotting, and shows good resistance to the effects of acid perspiration, steaming and cold water.

BOOK REVIEW

Textiles and the Microscope, by Edward Robinson Schwarz, McGraw-Hill Book Company, New York, 1933. 329 pages. $4.00.

The author of this book is probably the best man in this country on the technique and apparatus of Textile Microscopy and in this book he has incorporated much valuable information. The book is voluminously illustrated, perhaps rather too much so, since some of the illustrations are quite distant from the text which they illustrate. The chapters on cross-sectioning and the use of polarized light are particularly good, as they should be in view of their importance in modern textile research. The section on "empty magnification" is not as clear as it might be and certain topics which are obviously hobbies of the author are rather over-emphasized, but on the whole the text is well proportioned and exceedingly easy reading. The photomicrographs of fibers are rather poor, but the illustrations of yarns and fabrics are very good. The illustration of the Zeiss turtle on page 22 is particularly clear and sharp.

J. H. S.

M.I.T. Offers Special Textile Research Course for Mill Men

M.I.T. is again offering a special course in textile research intended for textile executives, research directors, laboratory technicians and others interested in this field beginning March 2, 1934.

The work is arranged to afford lecture and laboratory exercises on Friday and Saturday each week for six consecutive weeks.

Twelve lectures will be devoted to textile analysis and twelve to textile microscopy.

THE CONTINUOUS DYEING OF LOOSE COTTON

(Continued from page 90)

rial must stand washing and reasonable exposure to light. A good deal of work had been done with direct dyes.

Mr. J. Greenwood asked whether there was any difference in the fastness of the dyed and finished product as contrasted with similar material, which had been processed in accordance with the normal practice in this country?

The Lecturer said that he was not aware of any difference. Previously, he had used beam-dyeing machines, and, at first, it had appeared to him to be a difficult thing to demonstrate that it was possible to dye in 72 seconds, especially in a heavy shade, i.e., dyeing as distinct from plastering. Apparently it was possible, and the shades did not appear to be any worse. At any rate, the United States authorities accepted a shade for marine khaki, so that there could not have been very much wrong with it. In warp dyeing there was a greater tendency for the material to be dyed on the outside than the inside of the thread.

The Chairman asked if wetting-out was done with water or caustic alkali?

The Lecturer said that plain water was used, although a certain amount of hot alkali passed into the wetting-out box from the dye-bath.

Mr. H. Mennell asked if the machine had been used with vat dyes, which required oxidizing in air? Certain dyes, e.g., Indanthrene Grey K, bled if the goods were passed into water before complete oxidation had occurred.

The Lecturer said that he had not use that particular dye in the machine. He did not know whether there would be any removal of the color. It was possible to use Indigo with the machine.

Mr. H. à Brassard asked if the dyed cotton required to be lubricated, or did it spin as well as ordinary cotton?

The Lecturer said that spinning in the United States was more difficult because of the comparatively low R.H. He considered, however, that cotton dyed in the continuous machine, if handled correctly, could be carded and spun better than grey cotton. A fairly comprehensive range of types of cotton had been handled. They did not always dye to the same shade under given conditions, so that the substitution of one kind of cotton for another involved a change also of dye-bath.

Mr. F. Scholefield inquired about labor costs with the machine. Were they extremely low, e.g., somewhere about one-fortieth pence to one-fiftieth pence per pound? Also, what difference did the presumably high cost of the machine make with regard to the standing charges per pound?

The Lecturer said that he was not an accountant and could not answer the question.

The Chairman said that a machine of the type described practically absorbed the labor costs of 10 men.

Mr. G. A. Blakey said that there might be some danger of oxidation with such a large surface exposed to the atmosphere, particularly in dyeing vat colors.

The Lecturer said that the surface exposed in the dye-bath itself was roughly 12 feet by a little over 5 feet. That was no worse, e.g., than the exposure of yarn in hank dyeing.

Mr. Blakey said that was quite possible, but how was the circulation of the liquor affected?

The Lecturer said that the surface was not violently disturbed, but there was definite movement. Immediately the machine was started any oxidized film that was present would be removed. There were other factors also in connection with the "destruction" of the hydrosulfite, such as the temperature of the bath.

Mr. à Brassard mentioned that in the case of continuous dyeing machines used in this country for vat dyes, a pump or propeller was sometimes used to circulate the liquor.

Mr. H. Blackshaw inquired whether any attempts had been made to deal with azoic colors in the machine?

The Lecturer said that there was not sufficient demand for material dyed with these colors. It would be necessary to design a machine, which would give a much better squeezing effect. Further, the crystalline formation of many of the azoic coloring matters on the fiber was detrimental to carding and spinning operations.

Mr. Scholefield referred to the squeezing action of the machine and said that the water content was reduced to about 55% of the weight of the loose cotton; this figure was better than most of those obtained by hydro-extracting cotton yarn. The latter was usually dyed by passing it from the hydro-extractor straight into the developing bath, especially when using the modern substantive Naphtols.

The Lecturer said that the best drying action occurred in the final heavy-squeeze of about 14 tons per square inch; there was only a pressure of about 4 tons in the dye-bath itself and the moisture content was about 150%. It would be necessary to split the machine and add a heavy press and a "finishing-end" to satisfy the requirements enumerated by Mr. Scholefield.

Mr. G. S. Marr said that the human element could not be eliminated entirely when using the machine described. If an error from this source occurred, therefore, there would appear to be no alternative to re-dyeing an enormous quantity of material a deeper shade, e.g., black, so that the error would be an expensive one.

The Lecturer said that if the material had to be re-dyed, it must be dried. Wet cotton could not be put through the feeder. If stripping were necessary, it could be done better probably in this machine than in other types. The machine was built, however, for a specific purpose; it was not designed to remedy mistakes.

Dr. K. Turner said that in changing from one color to another it would not only be necessary to clean out the

bath very thoroughly, but also to clean the conveyor very thoroughly, to prevent fibers of one color mixing with fibers of another color.

The Lecturer said that the time lost in cleaning was 4 hours, and the manhole covers had to be taken off every tank and vacuum box. The machines were not intended really for changing from one shade to another. The Soviet authorities decided that gaberdines should be made with a range of four colors only, viz. black, a dark sulfur brown, a kind of khaki, and a light color, as they were using only four machines.

Mr. J. G. Evans asked if there was some form of automatic temperature-control on the dye-baths? Also, what was the fastness to rubbing of the dyeings? He believed the Lecturer had stated that a precipitate of dyestuff might form sometimes on the outside of the fiber in the first wetting-out bath. Was this correct?

The Lecturer said that the dye separated from solution in the wetting-out box; the liquid in this box was really an exhausted dye-bath when the machine had been running for some time. When dyeing Indanthrene Blue, a slight blue speckiness might be noticed all over the cotton, as it passed from the wetting- to the dye-bath, but there was not any plastering. The finished cloths certainly were better than those produced from cotton dyed in the old circulating type of machine because if there was a great wad of cotton through which the dye-liquor had to drain after the dyeing process, and the wad was absolutely saturated with the liquor, it followed that the first wash-water would remove some of the dye-liquor, but a portion of the dye would be oxidized and precipitated on to the fiber.

Mr. Scholefield asked how many workmen were required to look after the plant? He supposed they would be men who were required constantly to look after the supply of dye to the tanks.

The Lecturer said that the fewer the machines, the more work there was for the attendants. If there was a battery of machines, there could be separate groups of men for the dye and sodium sulfide supplies, respectively. With only one machine, however, one man was required to attend to the electrical hoisting tackle for picking-up and opening the drums, and for weighing the dyes, while it required the whole time of another man to patrol the machine. i.e., two men altogether.

To Occupy New Quarters

American Cyanamid Company, 535 Fifth Avenue, New York, has executed a lease with Rockefeller Center, Incorporated, covering about 120,000 square feet on the 57th, 58th, 59th, 60th and a part of the 61st floor in the new R.C.A. Building at 30 Rockefeller Plaza, New York. The lease is for a term of twenty years commencing March 1, 1934. It is expected that the new space will be occupied about April 1, 1934.

The move was necessitated by the need for more space by American Cyanamid Company to take care of its growing business and to provide for future expansion. As the Company occupies at its present address about twenty-five floors, each having much less space, the new location, being all on five adjoining floors, will lend itself to the much more efficient conduct of the Company's business.

Architect's Rendition of Rockefeller Center

American Cyanamid Company is a large producer of industrial and mining chemicals and fertilizer materials, and has plants and sales offices in many States. Among its subsidiaries which will have offices at 30 Rockefeller Plaza are the following:

American Cyanamid & Chemical Corporation.
American Cyanamid Sales Company.
Amalgamated Phosphate Company.
American Powder Company.
Arizona Chemical Company.
Beetleware Corporation.
The Calco Chemical Company, Inc.
Chemical Construction Corporation.
Chemical Engineering Corporation.
Fumigators Supply Company, Inc.
General Explosives Corporation.
A. Klipstein & Co., Inc.
Maryland Chemical Company.
Owl Fumigating Corporation.
Rezyl Corporation.
The Selden Company.
Structural Gypsum Corporation.
Synthetic Plastics Company, Inc.

DEPRECIATION OF TEXTILE MACHINERY

(Continued from page 92)

tinue research and experimental work will continue for some time, and that the next 10 years will show as great an improvement as the past 10 years. The depreciation for obsolescence on textile machinery must, therefore, be liberal to take care of this condition. While it is impossible to say which machines will be affected, or the degree of obsolescence that they will suffer, it is certain that obsolescence will occur and average rates must be used on all machinery, sufficient to cover this expectancy. It is generally agreed that this should not be less than 5 per cent. per year, and might be as high as 10 per cent.

The amount of depreciation having been determined, it has various uses, as follows:—

(1) It represents the decrease in value of the physical part of the plant and is deductible from the book value to get the present worth.

(2) It is the amount of the capital investment which is worn out and is a charge against manufacturing costs.

(3) It is the amount which should be set aside as a reserve each year to replace the original machine, or its equivalent, when it is worn out.

The depreciated value, which is found by deducting the total depreciation from the replacement or original cost, gives a figure which may have little or no relation to actual value. Changes in the industry, such as drastic changes in costs of machinery, over-expansion, underconsumption, or other agencies, may deflate values to a point far below book values; or country changes may increase market values above book values. Both have happened in the past 20 years.

Obviously, for cost-accounting purposes, book values cannot be changed to meet the rapidly fluctuating market values which are prevalent in these times. The depreciation is necessarily based on fair book values as represented by actual expenditures for machinery.

Agreement on Principles and Figures

The amount by which machinery is depreciated, or worn out, or made obsolete each year is as much a part of the costs of operation as labor or raw stock and as such must be included in the cost of manufacturing. While this principle is well recognized in mill accounting, it has not been sufficiently well understood, nor has a standard practice been established so that similar mills can use similar figures. The situation is growing better, however, much thought is being given to the subject, mills are comparing and agreeing on certain principles and figures, and some semblance of order is evolving out of the chaotic condition of the past.

When the amount of annual depreciation of textile machinery is set aside each year as a reserve to replace the machinery on its retirement, there are some other factors to be considered. During the useful life of a machine there is likely to be a considerable change in its cost, due to changing commodity prices or to improvements in the machine which increase its cost. The accrued amount at its retirement should be sufficient to replace it. Depreciation for this purpose should be calculated on replacement costs. Evidently new book values cannot be established each year, but they can and should be corrected at reasonable intervals to keep book values somewhat in line with actual replacement costs. In this way the reserve set up will actually replace the machine on its retirement at the then-existing cost. Because of the intermediate factor of obsolescence this can be only approximate.

Result of Insufficient Provision for Replacement

Many textile plants operating over long periods of years have not made proper provision for the replacement of worn-out machinery by the setting aside of adequate reserves as indicated by the annual amount of depreciation of textile machinery. They have, in fact, returned to the stockholder much of their capital in the form of dividends and have been unable to make major machinery replacements except by some plan of financing which obligated future earnings. To ensure continuity in business, to preserve the original investment in textile machinery, and to provide for replacements, reserves equal to the accumulated depreciation should be available.

Many schemes of estimating depreciation on machinery have been evolved, but in general two methods are used. One is the straight-line method, in which the same amount of depreciation is taken each year from the time of its installation, producing a reserve of constant growth. The other is a curved-line method, sometimes called the asymptotical method, in which the same yearly rate of depreciation is used but is applied to the remaining value each year. Other methods use a varying rate of depreciation generally starting with a higher rate and gradually reducing it. This builds up a reserve much faster in the earlier and presumably most productive years of the machine, and annual increments to the reserve become less as the machine requires more repairs and upkeep.

The Straight-Line Method

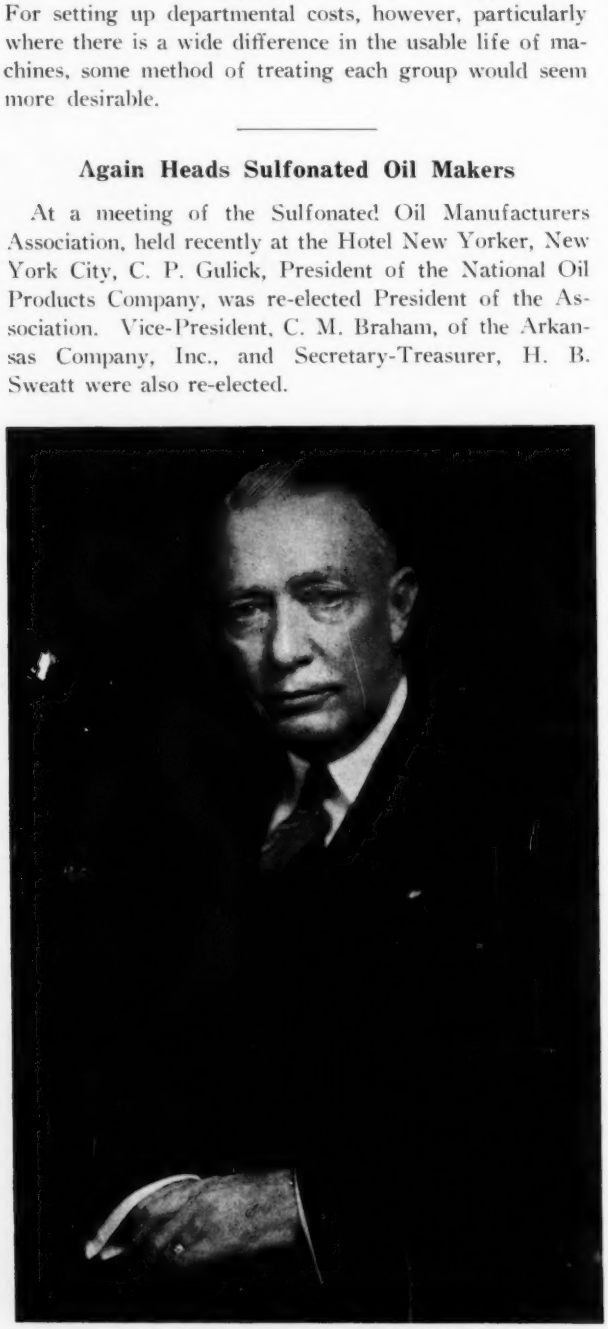
Each method has its ardent advocates, and presumably either can be used as conditions demand. The straight-line method is simpler to apply and serves all practical purposes for which depreciation is figured.

If the usable life of a machine is estimated in years and a rate of depreciation is set up to produce a reserve equivalent to its replacement cost in that period, it is obvious that no further depreciation need be figured on that machine at the expiration of that time. The machine may work some time beyond its allotted life, particularly if obsolescence has not taken place, without further reserve against it. On the other hand, if, because of unexpected obsolescence, its life is shorter than estimated, the remainder of its replacement reserve must be set up when the machine is discarded. Such refinements are possible only when a very accurate machinery account is kept, which is generally not the case. As a rule, machines of like use and of the same estimated usable life are bunched

together and the depreciation is applied to the whole. In many cases a general figure is used covering all the textile machinery in a plant without reference to its usable life. The total amounts obtained from such figures may be very close to those obtained by a careful segregation, and for some purposes answer all requirements. For setting up departmental costs, however, particularly where there is a wide difference in the usable life of machines, some method of treating each group would seem more desirable.

Again Heads Sulfonated Oil Makers

At a meeting of the Sulfonated Oil Manufacturers Association, held recently at the Hotel New Yorker, New York City, C. P. Gulick, President of the National Oil Products Company, was re-elected President of the Association. Vice-President, C. M. Braham, of the Arkansas Company, Inc., and Secretary-Treasurer, H. B. Sweatt were also re-elected.



C. P. Gulick, President, S.O.M.A.

The following were elected Directors: C. P. Gulick, V. H. Berman, J. G. Nathanson, C. M. Braham, D. S. Whiteman, H. B. Hooper, H. T. N. Smith, F. C. Scholler, John C. Wolke, C. D. Marlatt, A. E. White, and G. J. Desmond.

At a meeting of the Board of Directors the following Executive Committee was elected: C. P. Gulick, C. D. Marlatt, V. H. Berman, C. M. Braham, and J. C. Wolke.

PRECAUTIONS IN THE DYEING OF UNION GARMENTS

By **P. L. Mann**

WOOL, when chlorinated to render it unshrinkable is very difficult to dye satisfactorily. It is beneficial to treat it with a weak chloride of lime liquor at hand heat for 30 minutes and then dye with acid colors with the addition of formic acid. Colors specially suitable for this purpose are Fast Light Yellow 2GX conc., Fast Light Orange GA, Acid Violet 6BNOO, and Indigotine B extra conc.

The majority of articles dyed by the garment dyer are made from wool with a cotton admixture. It is advantageous for all items to be dry cleaned to ensure freedom from grease. They may be then further prepared, as seems necessary to the dyer, by a boil in water, a mild alkaline treatment with soda or ammonia, or, if necessary, a strip with hydrosulfite. In nearly every case the wool is dyed acid before the cotton; the cotton being filled in afterwards. With greens, for instance, the wool may be dyed with Alizarine Blue SAP and Fast Light Yellow 2GX conc; or if badly faded, with Patent Blue VA and Fast Light Yellow 2GX conc. Filling-in may be done in some cases with tanning and iron, or with Benzo Dark Green BA. Blues may be dyed with Alizarine Blue SAP or Alizarine Supra Sky R and shaded as necessary with Azo Phloxine GA; filling in subsequently with Brilliant Benzo Blue 6BA or Benzo Blue 2BA. Red is the only color which can often be dyed union, using Diamine Fast Red FC and Supranol Bordeaux B; but sometimes the fading is so bad that acid dyeing is necessary.

Blacks and Violets

The dyeing of blacks is always important and in this case speed is essential. The colors which may be used are Sulphon Cyanine Black 2BA for wool and Pluto Black G extra for the cotton. The Pluto Black G extra is used to give an extra fastness to light. It is rarely necessary to make any departure from this mixture. Occasionally where the article is badly faded it is advisable to dye the wool first with Sulphon Cyanine Black 2BA in an acid liquor and fill in with a cotton color afterwards. In nearly all cases, however, the ordinary neutral dyeing will cover fades satisfactorily.

For violets, where the fastness to light is the first consideration a mixture of Azo Phloxine GA and Alizarine Blue SAP may be used. Where exceptional brilliancy is required, fastness to light must be sacrificed and Formyl Violet S4BA or Acid Violet 6BNOO may be used. The cotton is subsequently filled in. Fancies are best acid dyed first with a mixture of Intensive Blue B, Patent

Blue VA, and Acid Violet 6BNOO, the first named color forming the bulk of the shade; followed by a filling in with a mixture Diazo Black BHN Extra and Direct Deep Black EA extra.

Faded Garments

There are several points in the dyeing of faded union material which are worthy of mention. In acid dyeing the wool, some acid colors cover fades better than others, and so a proper choice is essential. In dyeing compound shades with acid colors, fades are covered well if the dye liquor is made up originally to the right tone so that when the material is dyed deep enough it will be on-shade. If this is not done, and considerable shading is necessary with one of the colors, fades then have a tendency to show up.

Cotton colors dyed on wool show up fades to a great extent, and therefore, in filling-in the cotton after acid dyeing the wool, it is important to keep the direct color off the wool as much as possible. In the connection it is important first, to choose the direct color carefully with this property in view, and, secondly, the filling-in liquor must not become acid. When the practice is to use sulfuric acid in dyeing the wool, the filling in with cotton often goes wrong; the cotton is thin and too much color goes on the wool, as, no matter how carefully the rinsing operation is carried out, free sulfuric acid is carried over into the filling-in liquor. The adverse effect is cumulative with further batches of goods. It is advantageous to have an easy test for the pH value of the filling-in liquors; as the presence of color makes the ordinary tests inapplicable.

Silk and Cotton

Silk and cotton mixtures are quite an important class, as nearly all silk garments have cotton in some part of their construction. With this material the same precautions are needed as in the case of wool and cotton, except that fades need not be considered nor its fastness to light so important. Cellulose acetate silk by itself offers no particular problem except that of handling. Some forms of it are exceptionally sensitive to pressure and rubbing, and soon show glaze marks.

Combinations of cellulose acetate with cotton, rayon, wool or silk, formed a difficult problem in the early days, but there are now numerous ranges of colors which will produce uniform shades on the different fibers. The Plurafil colors have been found satisfactory.

NEW PATENTS

(Abstracted by S.O.C.M.A.)

Azo Dyestuffs Insoluble in Water and Fiber Dyed Therewith. (For use in the manufacture of pigment dyes and for the production of dyeings and printings on the vegetable fiber, giving a brilliant Turkey red dyeing with good fastness properties to chlorine, to boiling lye, to kier boiling and to light; obtainable, for example, by coupling with 2'3'-hydroxynaphthoyl-4-methyl-2-methoxy 5-chloro-1-aminobenzene the diazo compound of the hydrochloride of 4-chloro-2-methyl-1-aminobenzene.) Otto Sohst, deceased, late of Frankfort-on-the-Main-Hochst, Ger., by Adele Sohst, administratrix, Frankfort-on-the-Main-Hochst, Ger., assignor to General Aniline Works, Inc., N. Y., N. Y., No. 1,934,773, Nov. 14, 1933.

Manufacture of New Dyestuffs and the Application Thereof. (Comprises coupling a diazotized 2.4-dinitro-6-alkoxy or alkyl aniline or derivatives thereof with any suitable coupling component; especially of value for dyeing, printing, stencilling or otherwise coloring materials comprising cellulose acetate or other cellulose esters or ethers.) Denis Houghton Mosby, Henry Charles Olpin, and George Holland Ellis, Spondon, near Derby, Eng., assignors to Celanese Corp. of America, No. 1,935,657, Nov. 21, 1933.

Cyanine Dyes and Process of Preparing Them. (More specifically, a thio-pseudo-cyanine dye derived from 1-methyl-alpha-naphthothiazole alkyl quaternary salt; suitable for incorporation in, or coated upon, photographic gelatino-silver-halide emulsions in order to increase their color sensitivity. A division of application Serial No. 435,105, filed 3/12/30.) Leslie G. S. Brooker, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y., No. 1,935,696, Nov. 21, 1933.

Vat Dyestuffs and Process of Preparing Them. (For example, comprises heating naphthoylene-benzimidazol-peri-dicarboxylic acid or the anhydride with para-xylidine; dyes cotton clear yellow tints of good fastness.) Wilhelm Eckert and Otto Braunsdorf, Frankfort-on-the-Main, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,935,945, Nov. 21, 1933.

Acylamino-Anthraquinones and Process of Producing the Same. Important dyestuffs intermediates, obtained by condensing an alpha halogenacylamino-anthraquinone with an arylsulfonamide to form an alpha arylsulfonamido-acylamino-anthraquinone.) Rhys Jenkins Loveluck and John Thomas, Grangemouth, Scotland, assignors to Imperial Chemical Industries, Ltd., No. 1,939,218, Dec. 12, 1933.

Process of Making Cellulose Acetate. (Comprises treating cellulose with a pretreatment bath containing a substantial amount nitrogen tetroxide and thereafter acetylating the treated materials.) Cyril J. Staud and Charles S. Webber, Rochester, N. Y., assignors to Eastman Kodak Co., Rochester, N. Y., No. 1,939,235, Dec. 12, 1933.

Ortho-Aminoaryl-Alkysulfones and Ortho-Aminoaryl-Aralkysulfones. (Dyestuff intermediates obtained by reduction of the ortho-nitroaryl-alkylsulfones, ortho-itroaryl-aralkysulfones and their substitution products.) Kurt Schimmelschmidt and Hans Thomae, Frankfort-on-the-Main-Hochst, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,939,416, Dec. 12, 1933.

Dyestuff for Artificial Silk and Process of Making the Same. (Deals with the dyestuffs of the 1,4-diamine-anthraquinone series, dyeing cellulose ester material red-violet shades.) Henry R. Lee, So. Milwaukee, and Edwin C. Buxbaum, Shorewood, Wis., assignors to E. I. duPont deNemours & Co., Wilmington, Del., No. 1,939,593, Dec. 12, 1933.

Waterinsoluble Azodyestuff. (For example, cotton treated with 9-methyl-2-hydroxy carbazole-3-carboxylic acid-p-chloranilide is developed with diazotized m-chloraniline; when produced on the fibre, yield generally violet to brown shades of good fastness properties.) Friedrich Muth, Leverkusen-I.G., Werk, Ger., assignor to General Aniline Wks., Inc., N. Y., N. Y., No. 1,940,059, Dec. 19, 1933.

Copper Containing Azodyestuff. (Prepared, for example, from diazotized aniline-2-sulfonic acid and 1-amino-2-ethoxynaphthalene-6-sulfonic acid, further diazotized and coupled with 2-phenylamino-5-hydroxynaphthalene-7-sulfonic acid with the addition of pyridine and copper sulfate; dyes cotton, silk and viscose silk in bluish red shades, fast to alkalies and light.) Richard Stusser, Cologne-Deutz, Ger., assignor to General Aniline Wks., Inc., N. Y., N. Y., No. 1,940,066, Dec. 19, 1933.

Azo-Dyestuff Insoluble in Water. (For example, the diazo compound of 4'-nitro-2-amino-diphenyl coupled with 2 - (2' - hydroxy-3' - naphthoylamino)-naphthalene; yields when produced on fibers bright red to yellow to brown dyeings and printings of a good fastness.) Walter Zerweck and Carl Schutz, Frankfort-on-the-Main-Fechenheim, Alfred Carl, Cologne-on-the-Rhine, and Johann Rosenbach, Wiesbaden, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,940,068, Dec. 19, 1933.

Vat Dyestuff of the Dibenzanthrone Series. (More specifically, a new dyestuff compound which comprises reacting with an isopropylating agent upon a hydroxy-dibenzanthrone compound; cotton may be dyed in blue shades which are not fast to light and to alkali, the latter changing the dyeing to a strongly yellowish green.) Edward T. Howell, Milwaukee, and Otto Stallman, So. Milwaukee, Wis., assignors, by the mesne assignments, to E. I. duPont deNemours & Co., No. 1,940,419, Dec. 12, 1933.

Waterinsoluble Disazodyestuffs. (Obtainable by coupling with a di- (aceto-acetic arylide) which is not substituted by a carboxylic acid-, sulfonic acid or hydroxy group, a diazo compound of an ortho-amino-benzophenone; dye yellow shades of good fastness to washing, chlorine and kier boiling.) Heinrich Clingestein, Cologne, and Karl Dobmaier, Leverkusen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,940,662, Dec. 26, 1933.

Disazo Dye and Method for Its Preparation. (Comprises coupling a diazotized aminoazo compound of the benzene series which contains not more than one sulfo or carboxy group to an aroyl-amino-aroyl-2-amino-5-naphthol-7-sulfonic acid, preferably a benzoyl-amino-benzoyl-2-amino-5-naphthol-7-sulfonic acid; dye cotton and regenerated cellulose bright bluish-red shades of good fastness to washing and light.) Henry Jordan, Wilmington, Del., assignor to E. I. duPont deNemours & Co., Wilmington, Del., No. 1,940,683, Dec. 26, 1933.

Azodyestuffs Insoluble in Water and Process of Making same. (It is claimed that the present process is of a peculiar technical value as it is the first time that the manufacture of green monoazo dyestuffs is successful. For example, diazotized 5-chlor-ortho-toluidine is combined with 6-phenyl-amino-2-naphthol-3-carboxylic acid arilide; yield valuable color lakes when mixed with the usual substrata or fast dyeings and printings on the fiber when prepared according to the ice-color method.) Leopold Laska and Bruno Heyn, Offenbach-on-the-Main, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,941,035, Dec. 26, 1933.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Expert in Aniline dyes and lake colors desires permanent connection. Firms interested in developing new products and color schemes for various industries will communicate.

Salary requirements in keeping with highest type of educational and practical training. Write Box No. 802 American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED: Young college graduate, B.S. Textile Chemistry with eighteen months' experience in finishing plant, desires employment. Interested in rayon or chemistry, but will consider anything that offers an opportunity to obtain experience and advancement. Write Box No. 803, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

WANTED: Exceptional opportunity with a large manufacturer for a dyestuff salesman in New England territory. Must be thoroughly familiar with the Print Works trade and the application of the various classes of dyestuffs and related products. Write Box No. 804, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED: Boss dyer or finisher, woolen, worsted, rayon, silk or artificial silk, or would accept salesman's position for dyers, soaps or mill machinery. Address Mr. Platz, Room 205, Hotel Willard, Worcester, Massachusetts.